

THE AUTOMOBILE

LIKE EQUIPMENT is valuable in proportion to its ability to spill water on a conflagration, but it is of the greatest possible advantage to start the spilling process at the earliest moment after the fire has been started. There are a hundred reasons why prompt action is more efficacious than would follow the use of a mass of equipment on a procrastinating basis. There is no possible way of determining the relations which must exist between the effort required to quench a fire after it is well under way, as compared with the lesser effort, when the work is promptly begun. It might even be looked upon as a wasted effort to discuss this phase of the problem, but if it is well understood, it is amazing that fire departments persist in adopting animal-drawn equipment, when the automobile situation is sufficiently well in hand to serve every need, besides offering the advantage of greater promptness in putting streams on fires.

It is not the purpose here to delve into the theory of fire fighting, unless superficially, and to the extent which will be necessary in order to emphasize the importance to be attached to promptness. It is conceded that a fire equipment should possess a certain vigorosity, but it is only a matter of a few days ago when the writer witnessed the burning to destruction of a building with the fire engines stuck in the mud within a block of the scene of action. The engines were big enough; they were designed to throw a sufficient stream of water to accomplish the purpose, but they were handicapped by their weight, the condition of the pavement, and the inability of the horses to make headway.

This extreme case will serve as the preliminary in a further illustration of the differences which are not always taken into account. Admitting that the equipment should have a certain ability, it must also be conceded that it must be mobile. It is just as necessary to be able to move with speed and a certain exactness in going to a fire as it is to be able to apply vigorous streams of water, and remembering that a fire may be most readily quenched if the streams are directed thereon at the propitious moment, it may be that speed of the apparatus en route has a greater measure of virtue than will be found in a large capacity pumping engine.

These very ideas lead up to a detail which is pretty generally overlooked by the City Fathers in their wisdom; if it is a distinct advantage to move to a fire with speed and certainty, it will be almost equally advantageous to speed back again in order to be ready for any possible contingency which may arise. If the fire equipment is sufficiently mobile, and has the property which will make it efficacious, it will not only do its work quickly, due to a prompt start, but it will be back again at its station awaiting an alarm.

Without attempting to be exact, it might be within the bounds of reason to proclaim that a company, if it arrives on the scene of a fire within half the time as ordinarily taken will be able to do its work at one quarter of the loss which would result under the first conditions named, but if it does its work in half the time, it will be available to do other work the other half of the time, and conclusions may be drawn as follows:

- (A) One half as much fire equipment will accomplish the given work.
- (B) The fire loss will be reduced to one-quarter.

Municipalities are never justified in counting the cost of a fire department in dollars expended. It is necessary to consider the saving of life and property which is realized by utilizing an organization of this character. It

makes no difference then, as to whether or not the automobile type of fire fighting equipment will cost more or less than the conventional (animal drawn) equipment, since at any price likely to



be charged, the equipment will cost but a small percentage of the saving it will effect to the community.

It is not conceded that automobile fire-fighting equipment will be more expensive than the animal-drawn apparatus, for the reason that the very promptness with which streams may be applied to fires reflects the small time which would be taken in putting them out, and if the equipment will do the work in less time, less of it will have to be used in a given zone for fire protection. Entirely aside from the conditions as above enumerated, there is still another angle from the cost point of view, which amounts to a paramount issue.

It is the uniformed force which bears most heavily, financially, upon the community, and if it is true that automobile fire equipment would reduce this force numerically, if it might not be cut in half, the cost of maintenance will then be nearly halved, and the difference in money value will be sufficient to pay interest upon a vast amount of equipment, but the conditions are such that the increase in equipment would not have to be made.

ENLIGHTENED METHODS ARE MAKING SUBSTANTIAL HEADWAY

Despite the uproar which is frequently made by reluctant taxpayers, the automobile is making inroads in fire-fighting work, and it is only necessary to discuss the situation using some one illustration to bring out the point which it is desired to make. Take for illustration the Boroughs of Brooklyn and Queens in the City of New York. Deputy Chief Thomas Lally in charge, who answers to every second alarm, must cover over 141 square miles of territory. In the old days the work was done by the horse and carriage, as shown in Fig. 1; but it was obviously impossible for a general officer to be first at a fire in a territory so large if the fire happened to be in a remote district. As for covering two fires within a short time of each other, to do so with the horse and carriage was utterly impossible.

The first change from the old idea came with the purchasing of a 16-horsepower Locomobile, as shown in Fig. 2, and while the little car was a revelation to the department, and gave the utmost satisfaction, the fact remains that it was the smallest size of regular touring car as then made by the company, and it indicated quite comprehensively the attitude of the City Fathers



Fig. 1—Horse and carriage formerly used by Chief Lally in the Borough of Brooklyn, New York City, with 141 square miles of territory to cover

who seem to count the cost of the individual automobile in dollars rather than the value of the service.

After two years of the most strenuous type of service it was decided that the 16-horsepower Locomobile should be put in good working order and held in reserve. Up to this time the horse and carriage were held in reserve, but the extraordinary value of the service rendered by the Locomobile made it impossible to consider the advisability of using a horse and carriage, even in a supernumerary capacity. The next move was in the nature of a distinct advance, resulting in the purchase of a 50-horsepower Berliet (Alco), as shown in Fig. 4. This car offers the extra advantage of increased weight, larger diameters of tires, more power, storage capacity for clothing and appurtenances, and the speed over cobblestone pavement, of which Brooklyn has some hundreds of miles, is considerably higher than that which was formerly realized.

The conditions in Brooklyn are such that the Deputy Chief in charge turns out for first alarms in the high-pressure zone, on the park slope and along the water front, and, as before stated,



Fig. 2—Sixteen-horsepower Locomobile which was purchased by the department to replace the horse and carriage shown in Fig. 1. and is still in use as a supernumerary



Fig. 3—Oldsmobile police patrol as used by the department at Lansing, Mich., with excellent results, illustrating the added advantage of automobiles in police departments

for every second alarm. A canvass of the situation indicates with reasonable accuracy that Chief Lally goes to at least one fire per day for every day in the year, and not counting departmental inspections, travels at least a distance of 10 miles per run. It will readily be observed that there is no possible animal-drawn vehicle which would be capable of making these long runs on any basis whatever.

In the old days, then, considering the exigencies of service, the general officer in command of the department rarely ever gave the fire fighters the benefit of his skill and experience, and it was even a question if district deputies went to all the fires within the confines of their own territory. It is probably true that battalion chiefs went to every fire, but it cannot be said of them that they arrived in time to be of maximum service.

It is of incalculable advantage if field officers are on the ground ahead of the engine companies, for then they will be in a position to determine as to the extent of the conflagration, locations of hydrants, characteristics of the structures, and will be enabled to determine as to the best plan of action, so that

when the companies come up they may be instructed in accordance with a definite plan of action.

On divers occasions it was found that additional alarms should be sent in, and the general officer upon arriving, even ahead of the companies which respond to the first alarm, promptly sent in the additional alarms, which, according to judgment, would call out the requisite number of companies, and by so doing save much valuable time. In the old way, the second, third and fourth alarms were turned in successively upon the arrival of the respective commands, and frequently the Chief of the Department found the distance too great to permit of responding to anything but a third or fourth alarm.

Experience with the automobiles as used by general officers has been favorable, and in so many ways that fire equipment of the automobile type is expanding at a rapid rate, so that to-day it is possible to procure from reliable makers divers types of equipment. Fig. 5 represents a Knox type of a hose wagon, as used in the New York Fire Department. This wagon, in addition to affording a sufficiently large platform on which to lay down the hose, offers the special advantage of a high-pressure nozzle, mounted on a stand, and mechanically designed to swivel into any desired position. The wagon is of stout design, with a tool box located under the body at the rear, and facilities for the orderly placing of firemen's appurtenances, and such other contrivances as are used in this service.

A platform for the hose is much more efficacious than any form of reel thus far tried out, not only as respects the length of hose which can be carried, but from a point of view of speed when running a line at a fire. The reel idea has its awkward situations. The hose is likely to be tangled up on occasions, and the total length of hose which can be reeled on is variable, depending upon the care with which the work is done; but it must be appreciated that care suggests time, which must be taken. The bottom illustration, Fig. 11, shows a Knox type of hose wagon, which is devoted to the high-pressure service in the New York Fire Department, and it illustrates how the hose is carried on the platform. There have been many attempts to improve upon this plan, but nothing thus far seems to possess the inherent merit of this simple process. The center illustration of

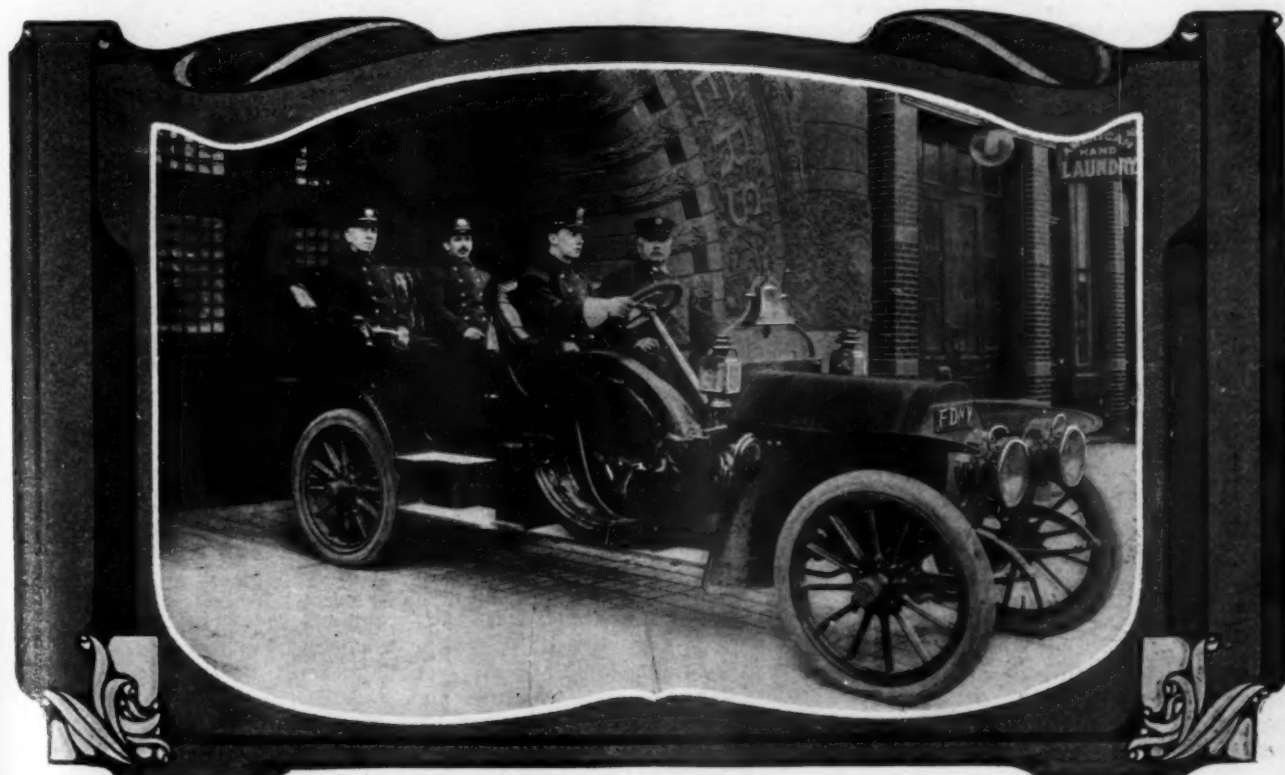


Fig. 4—Berliet (Alco) fifty-horsepower touring car now used in the Borough of Brooklyn by Deputy Chief Lally to cover one hundred and forty-one square miles of territory

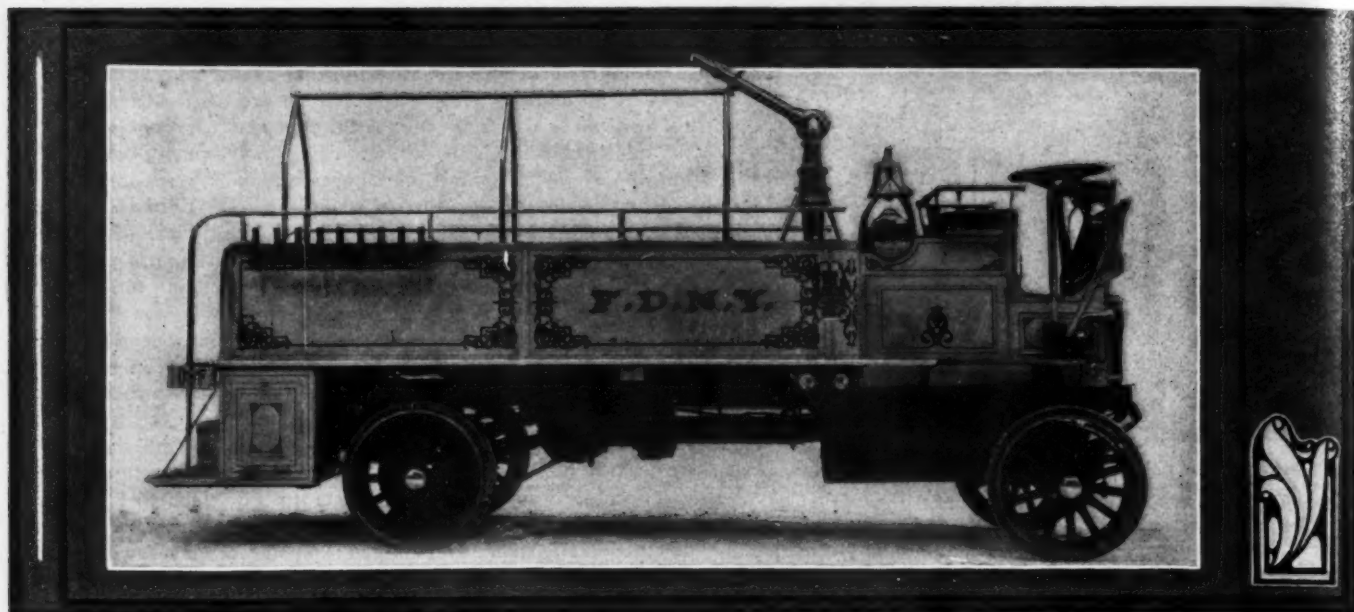


Fig. 5—Knox hose wagon, with swivel nozzle mounted in front, as used in the New York Fire Department

Fig. 11 shows a type of wagon as manufactured by Thomas B. Jeffery & Co., which serves for the first alarm work, having all the advantages of a chemical engine with a sufficient length of hose on a reel, and an ample supply of tools, as pikes, axes, etc., with seating capacity for the full company, and all the advantages of speed and endurance that are possible to obtain in connection with an automobile. The top illustration of the same figure presents a Pope-Hartford chemical equipment, which is used by the Bristol Fire Department, in connection with which provision is made, not only for the chemical apparatus and hose, but ladders as well.

Fig. 8 shows still another type of chemical as made by the Everitt-Flanders Company, the particular example being in use at Taunton, Mass. In this case the Chief, with a limited crew, is enabled to go to a fire at top speed, and arriving on the scene in time frequently permits him to put out the fire before it assumes more than still alarm proportions. This car and the manner of its use offers a clinching argument in favor of prompt action.

Figs. 6, 7, 9 and 10 were taken by R. D. Lillie, especially for *THE AUTOMOBILE*, at Lansing, Mich., and they represent the advanced methods which obtain in this progressive city. Fig. 6 shows the engine ready to go into action with hose, ladders, lamps, tools and a chemical auxiliary available for instant use. Fig. 9 is another view of the engine, which was taken in front of the fire house at Lansing, just as the same would appear ready



Fig. 6—Webb engine mounted on an Oldsmobile chassis as used at Lansing, Mich., showing the same going into action

to respond to an alarm. The Lansing chemical is shown in Fig. 10, and it has been found to serve the purpose with high efficiency. The Chief's wagon is presented in Fig. 7. It is a run-about type of automobile, seating four, and is equipped with a chemical auxiliary, lanterns, tools and such other fire-fighting facilities as will be found of great advantage during the early stages of a fire.

The illustrations here offered cover the field in a general way, and to view them properly is to reach one conclusion of perhaps the greatest importance, from the point of view of fire-

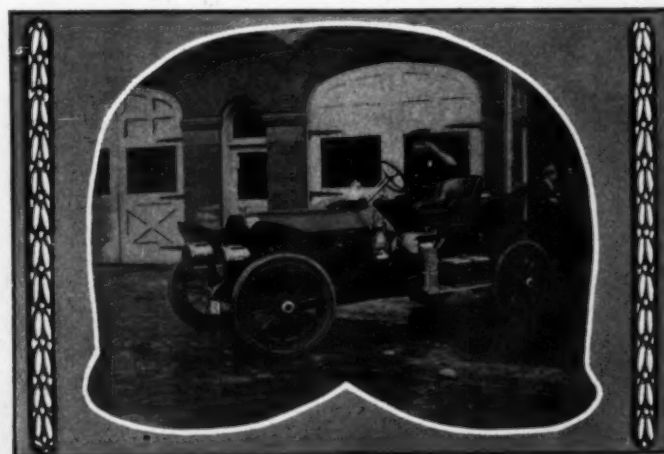


Fig. 7—Chief Hugo R. Delfs, of the Lansing Fire Department, starting for a fire in the Oldsmobile

fighting. Promptness, which is said to be a virtue, is best exemplified in this class of work, and each one of the efforts made had this promptness as the underlying feature.

HIGH-PRESSURE SYSTEMS INCOMPLETE WITHOUT AUTOS

In the big cities, especially New York, modern "skyscrapers" so called, although they are said to be absolutely fireproof, must be protected from fires in adjacent buildings, and to whatever extent furnishings augment the fire risk, these buildings, some of them 30 stories high, can only be protected when a high-pressure system is employed, and even then promptness in applying streams has even greater virtue than would be true under ordinary conditions, due to the relative inaccessibility of the fires when started, and to the greater risk.



Fig. 8—E-M-F car used at Taunton, Mass., showing a chemical equipment on the running board; also the chief and company.

If a high-pressure system is available, which is true in New York City, all that is required is the requisite number of hose wagons, as illustrated in Fig. 5, and perhaps towers, although every building of importance within the metropolitan areas is provided with a system of standpipes. It was shown that the utilization of automobiles for field officers made it possible for them to go to every second alarm fire, even when the district covers more than 140 square miles, and to respond to first alarm fires within the solidly built-up districts. If it is advantageous to have the general officers so equipped that they will be enabled

GASOLINE PUMPING ENGINES NOT SUFFICIENTLY DEVELOPED

One reason why automobile fire fighting equipment has not been adopted more readily, may be assigned to the absence of suitable headway in the design and production of pumping engines of the class which utilize gasoline motors as the source of power. This phase of the situation has been retarded for two reasons, one of which lies in the lack of enterprise of the makers of automobiles. They have confined their efforts to the class of cars which were most readily sold (pleasure automobiles), but they are beginning to realize that there is such a thing as overproduction, and they probably do appreciate the necessity of having a second line of defense. Commercial automobiles are rapidly supplanting horse-drawn vehicles in ordinary commercial pursuits, and, as they develop along substantial lines, they will serve as the basis for special efforts, and with slight modification become available as the basis of design of fire-fighting equipment.

It is possible that public opinion will have to be aroused, to some extent, in the process of completing the evolution in favor of automobile equipment for fire departments, and unfortunately, the public is now divisible into two camps, the one of which realizes the stability of automobile equipment and the increased value which comes from its use; the other is bound down by inertia, which comes from lack of knowledge, hence absence of appreciation, and decries efforts at advancement.

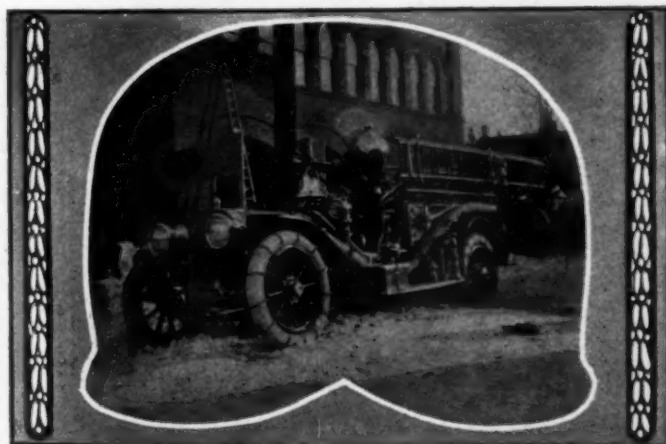


Fig. 9—Webb engine in Oldsmobile at Lansing, Mich., standing in front of the fire house ready for instant use

to reach the scene of a fire first, this is equal to saying that the company should arrive soon enough to accept directions. It must be quite plain to any one that in the absence of fire equipment with which to proceed with the work, a general officer arriving on the scene can do but very little. It is the effort which counts above everything else, if the apparatus is not far behind, and if the streams can be applied forthwith.

In addition to the fire equipment proper, there are other situations to be taken into account, as, for illustration, the tenders. Then, there are the police patrol wagons, and hospital ambulances. It is of equal importance that these auxiliaries to a fire department, which is what they become under severe conditions, should be equipped to proceed with the utmost speed and certainty promptly upon call.



Fig. 10—Chemical used at Lansing, Mich., showing an Oldsmobile chassis and every facility for quick work

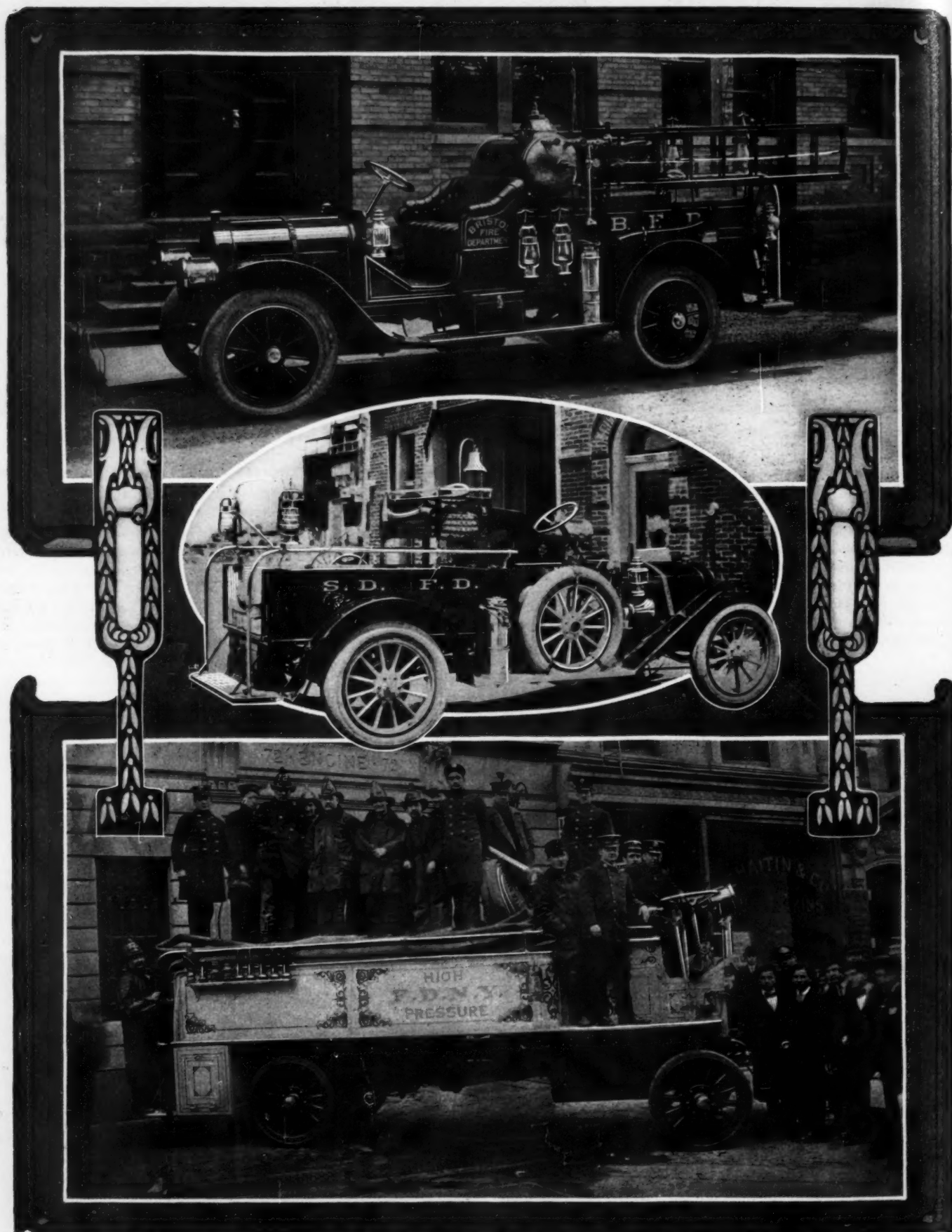


Fig. 11—Top—Pope-Hartford chemical equipment as used by the Bristol Fire Department. Middle—Example of Rambler fire-fighting automobile. Bottom—Knox hose wagon used by New York Fire Department



Graphical Determination of Transmission Loads

By L. C. FREEMAN

THE question of the selection of the proper sizes of ball bearings for any given set of conditions is one that should receive the consideration of those most expert in their design and application. However, in change speed gear design, where the ratio between the diameters of the bearings and the diameters of the gears is small, the sizes of the bearings have so great an influence on the center distance of the shafts and the shape and outline of the casing that a change in the bearings from those originally laid out frequently necessitates the redesigning of the whole job. This, viewed from an economy standpoint, is a sheer waste of money that can be avoided and easily too. With an idea of aiding in this the following article was written.

This analysis is presented with the idea in view of determining the most important factor to be considered in the selection of the bearings, viz., the maximum loads imposed on them by the action of the gears. This will be found, and has been found in actual practice, to call for bearings of such size that a consideration of the other factors will not change them to an extent sufficient to cause a rearrangement of the entire mechanism. The other principal factors to be considered are the effects of unbalanced rotating parts, of brakes and sprags, of universal joints, of variations in the loads and the period of these variations. The latter will usually be found to permit a certain per cent. overload on reverse, sometimes 75 per cent. or over, due to its infrequent use.

The assumption then on which this analysis is based is that there are no forces acting on the bearings except those due to the gear pitch line loads.

The data required is the maximum turning moment, the diameter of the driving wheels, the load on the rear axle and the maximum coefficient of friction between the tires and the ground.

The method can best be illustrated by assuming the data and working out an actual example.

The motor develops 40 horsepower at 1,000 revolutions per minute. Spur gears, 6-8 pitch, having a pressure angle of 20 degrees. Bevel gears, 5 pitch, with 14 1-2 degrees pressure angle. The pressure on the bevels is assumed to act on the largest pitch diameter.

The arrangement of gears and numbers of teeth is shown in Fig. 1. Center distance of shafts, 4 1-2 in.

Gear 1—20 teeth, 6-8 pitch..... 3.333 pitch diameter
" 2—34 " 6-8 " 5.666 " "

Note.—Paper read at semi-annual meeting of the Society of Automobile Engineers, Jan. 13, New York City.

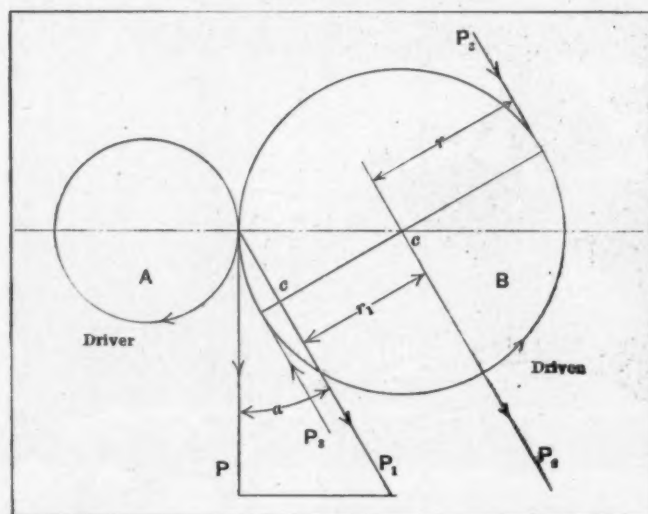


Fig. 2—Diagram of tangential pressure on gear teeth

Gear 3—28 teeth, 6-8 pitch.....	4.666	pitch diameter
" 4—26 " 6-8 "	4.333	" "
" 5—36 " 6-8 "	6.000	" "
" 6—18 " 6-8 "	3.000	" "
" 7—15 " 6-8 "	2.500	" "
" 8—18 " 6-8 "	3.000	" "
" 9—20 " 5 "	4.000	" "
" 10—60 " 5 "	12.000	" "

Thirty-four-inch driving wheels with 2,500 pounds on the rear axle.

Sixty per cent. maximum coefficient of friction between the tires and the ground.

$$\text{Maximum turning moment is } \frac{\text{Horsepower} \times 33,000 \times 12}{N \times 2\pi} = \text{pr.}$$

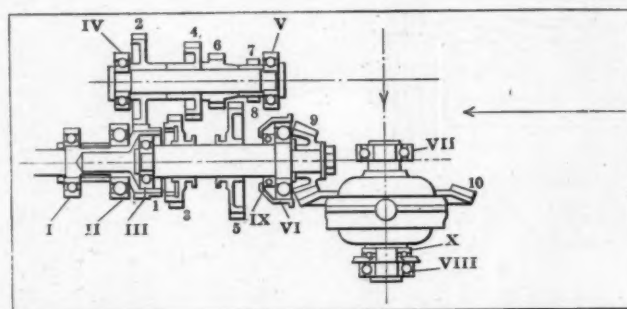
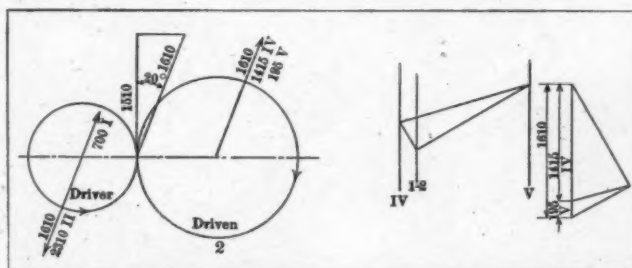


Fig. 1—Arrangement of gears in an actual example of a transmission



Figs. 4 and 5—End view of pitch circles showing notation

Where N = revolutions per minute;
 r = radius of gear in inches;
 p = tangential pressure on pitch line.
 $40 \times 33,000 \times 12$
 $\frac{1,000 \times 2\pi}{2,500 \times .60 \times 17} = 2,520 \text{ inch-pounds.}$

Pressure at largest pitch diameter of bevels necessary to slip
 $2,500 \times .60 \times 17$
 $\frac{6}{4,250 \text{ pounds}} = \text{maximum pitch line}$

load on bevels. This is equivalent to a turning moment on the pinion shaft of $4,250 \times 2 = 8,500 \text{ inch-pounds.}$

Turning Moment on Pinion Shaft

Pitch line load on constant mesh gears is

$$\frac{2,520}{1.666}$$

$$1,510 \text{ pounds (gears 1 and 2) } 2,520 \text{ inch-pounds.}$$

Pitch line load on second speed gears is

$$\frac{1,510 \times 34}{26}$$

$$1,970 \text{ pounds (gears 3 and 4) } 4,600 \text{ inch-pounds.}$$

Pitch line load on first speed gears is

$$\frac{1,510 \times 34}{18} = 2,850 \text{ pounds (gears 5 and 6) } 8,550 \text{ inch-pounds.}$$

Pitch line load on reverse gears is

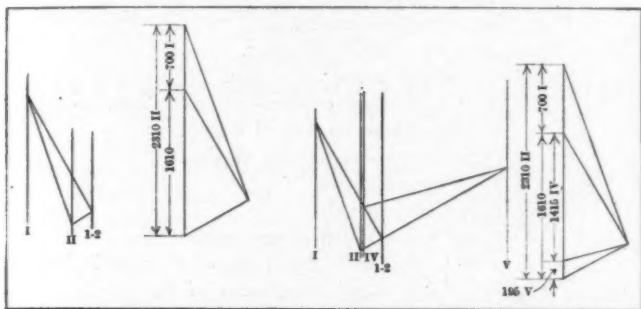
$$\frac{1,510 \times 34}{15} = 3,420 \text{ pounds (gears 5, 7 and 8) } 10,250 \text{ inch-pounds.}$$

But 8,500 inch-pounds is the maximum turning moment that can be applied to the pinion shaft without slipping the wheels.

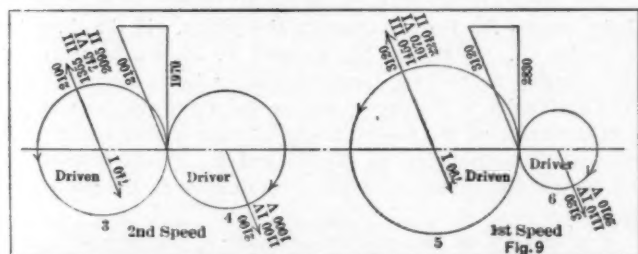
It will be seen that this is slightly less than that due to the first speed gear, and that the full power of the motor cannot be transmitted on reverse.

The pressure on the bearings of a pair of gears is equal to the pitch line tangential pressure multiplied by the secant of the pressure angle of the tooth, and the sum of the loads on the bearings of one gear is equal to the sum of the loads on the bearings of the other. That this is true may be seen by reference to Fig. 2.

A is the driver, B the driven gear, P the force acting tangent to the pitch circle, P_1 the pressure along the line of action, α the



Figs. 6 and 7—Graphical method of finding component forces acting



Figs. 8 and 9—Stress diagrams for gear pairs 3 and 4, 5 and 6

pressure angle, P_2 the pressure on the bearings parallel to P_1 , and the forces P_2 form the resisting couple.

The moment of P about O equals the moment of P_1 about O.

$$P_1 = P \sec \alpha \quad \frac{r}{r_1} = \frac{P_1}{P} \quad Pr = P_1 r_1$$

$$r = r_1 \sec \alpha \quad \frac{r}{r_1} = \frac{P_1}{P}$$

The turning moment must be equal to the resisting moment, or

$$Pr = P_1 r_1 = 2 P_2 r. \quad (1) \quad \text{Taking moments about c,}$$

$$\frac{P_2 (r + r_1) + P_2 (r - r_1)}{2} = P_2$$

$$\frac{2 P_2 r}{r_1} = P_2 \text{ from (1)} \quad \frac{2 P_2 r}{r_1} = P_1 \therefore P_1 = P_2$$

Similarly for gear A

Fig. 3 is a skeleton diagram of Fig. 1, giving the distances between the centers of the gear pairs and bearings. All end views are taken in the direction of the arrows.

Lay off end views of the pitch circles of the gear pairs showing direction of rotation as in Fig. 4, which represents the constant mesh gears 1 and 2. Normal to the center line lay off the pitch line tangential pressure to scale, and consider it as one of two components of the pressure along the line of action, the other being parallel to the center line of the gear pairs.

This pressure along the line of action is equal to the sum of the pressures on the bearings of gear 2 and to the sum of the pressures on the bearings of gear 1, and for each shaft must be resolved into two parallel components acting at the centers of the bearings. These will be inversely proportional to the distances from the centers of the bearings to the centers of the gear faces.

The graphical method of finding these components is exactly the same as that for finding the reactions of the supports of a beam with a concentrated load. The solution for gear 2 is shown in Fig. 5, where the pressure on bearing IV is found to be 1,415 pounds and on bearing V 195 pounds.

In Fig. 6, the solution for gear 1, it will be noticed that the pressure on bearing II is equal to the sum of the pressure on bearing I and the pressure on the line of action of gear 1; that the pressure on bearing I acts in the opposite direction from that on bearing II, and that there is no pressure on bearing III from this gear pair.

These bearing pressures are then transferred to the end views of the gear pairs as in Fig. 4, thus determining their direction. Fig. 4 then shows the magnitude and direction of the pressures on all the bearings affected by the action of gears 1 and 2. Figs. 5 and 6 may be combined as in Fig. 7, thus reducing the number of measurements to be made, and consequently the liability of error.

Figs. 8 and 9 are the end views of gear pairs 3 and 4, and 5 and 6, respectively. Figs. 10 and 11 are the end views of gears 5, 7 and 8, Fig. 10 showing the reverse idler above the other two gears, and Fig. 11 shows it below. If, because of structural difficulties, the reverse can be placed in but one of these positions, the other, of course, will not be considered.

It will be noticed that the pitch line load on the first speed and reverse gears in Figs. 9, 10 and 11 is taken as 2,830 pounds instead of 2,850 pounds for the first speed, and 3,420 pounds for the reverse, which we found by figuring from the motor torque. However, we have seen that 8,500 inch-pounds is the maximum turning moment that can be applied to the pinion shaft without slipping the wheels. The radius of gear 6 is 3 inches and

$$\frac{8,500}{3} = 2,830 \text{ pounds, which is the maximum pitch line load on gear 6.}$$

Although the pitch line loads on the first speed and reverse gears are the same, the point of application of the load is in a different plane, and so it is necessary to construct the equilibrium and vector diagrams for each case. The bearing load distribution is the same for Fig. 11 as for Fig. 10, the only difference between the two cases being in the direction of the pressures.

Fig. 12 is the load distribution diagram of Fig. 8. The pressure on the line of action, 2,100 pounds, is resolved into the two parallel components 1,100 and 1,000 pounds acting on bearings IV and V respectively, and also into the components of 1,355 pounds and 745 pounds acting respectively on bearings III and VI. The

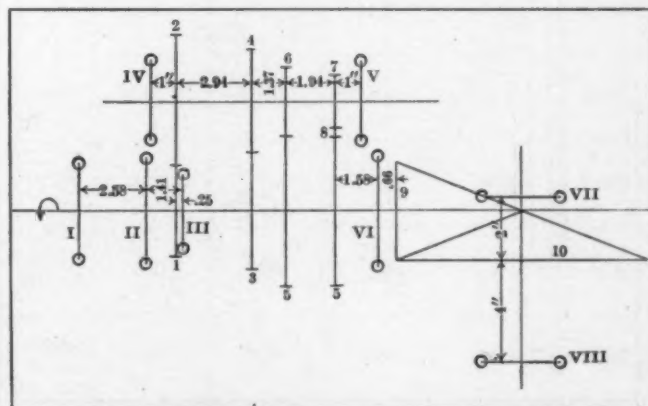
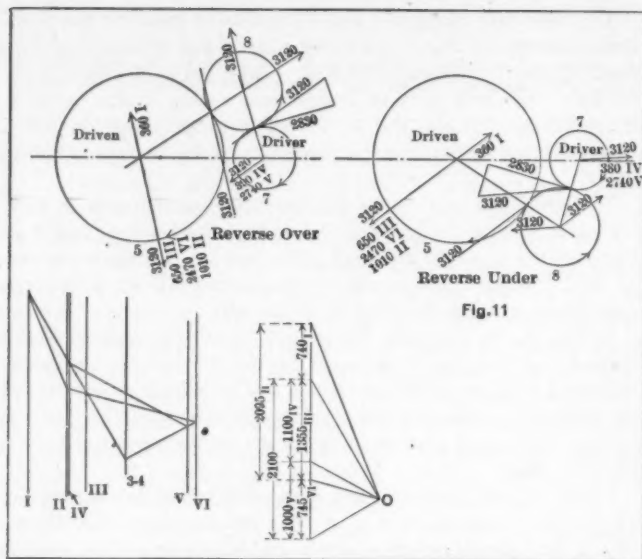


Fig. 3—Diagrammatic layout of transmission giving distances



Figs. 10, 11 and 12—Layout and stress diagrams for gears 5, 7 and 8

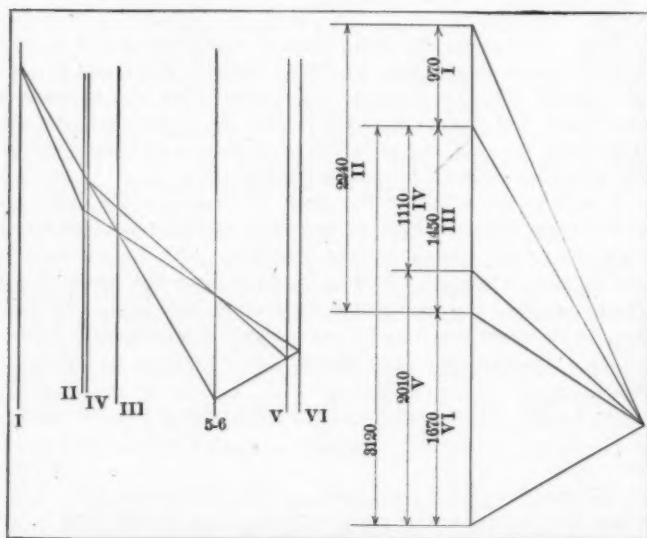


Fig. 13—Load distribution diagram for first speed gears

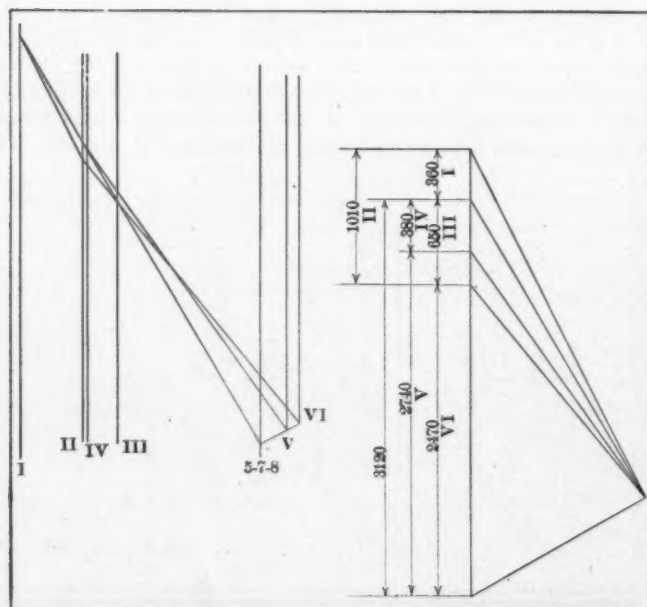


Fig. 14—Load distribution diagram for reverse gears

load of 1,355 pounds on III is then resolved into loads of 740 pounds on I and 2,095 pounds on II.

Figs. 13 and 14 are the load distribution diagrams for first speed and reverse, respectively.

The general equation for thrust on a bevel gear pair is:

$$T = P \tan \alpha \sin \beta, \text{ where}$$

T = thrust.

P = tangential pressure on pitch line.

α = pressure angle.

β = pitch angle of gear.

The equation for radial load is:

$$L = \sqrt{P^2 + (P \tan \alpha \cos \beta)^2}$$

where L = radial load.

These mathematical expressions do not show the direction of the forces acting, and as these have to be taken into consideration, the graphical method which gives a complete solution is used. This is in fact the principal reason for the use of the graphical method throughout this analysis.

Notation for Fig. 15.

A = Driving pinion.

B = Driven gear.

α = Pressure angle.

β_1 = Pitch angle of gear.

β = Pitch angle of pinion.

P = Tangential pressure on pitch line.

P_1 = Pressure on line of action.

P_2 = Thrust component of P_1 .

P_3 = Pinion thrust.

P_4 = Gear thrust.

P_5 = Pinion radial component of P_2 .

— 1,510 pounds (gears 1 and 2) 2,520 inch-pounds.

P_6 = Gear radial component of P_2 .

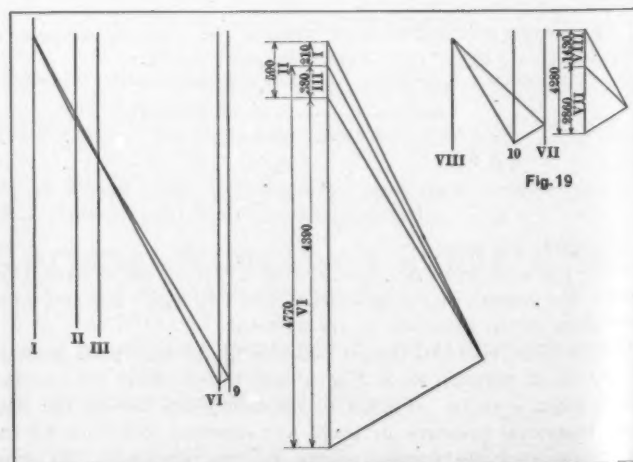
P_7 = Pinion radial load.

P_8 = Gear radial load.

The black arrows indicate forces acting on the gear, and the light arrows the forces acting on the pinion. If the three large triangles, P , P_1 , P_2 ; P , P_1 , P_3 , and P , P_4 , P_5 , were revolved downwardly about their shortest sides as an axis until in planes at right angles to the paper, they would represent the magnitude and direction of the forces acting in these planes or in parallel planes. The triangles P_3 , P_4 , P_5 and P_6 , P_7 , P_8 represent the magnitude and direction of the forces acting in the plane of the paper.

P is laid off on the common element of the two pitch cones. P_1 on the line of pressure and P_2 drawn normally to P precisely as for spur gears.

Care must be taken in determining on which side of P P_1 shall lie. This point is brought out more clearly by reference to the analogous spur gear diagrams in Fig. 16, in which it is seen that for the four cases the line of pressure has but two possible inclinations.



Figs. 18 and 19—Load distribution diagram for all bearings

P_1 is then resolved into two components, P_1 acting axially and P_2 radially on the pinion, and also into P_3 acting axially, and P_4 radially on the gear. Then the radial loads on the gear are P_4 acting in the plane of the paper and P_2 acting vertically to the plane of the paper, and their resultant is P_5 . Similarly the resultant of P_3 and P_1 is P_6 . These radial loads are then transferred to the end views of the gears as shown.

Careful attention should be paid to the direction of the forces and reactions, remembering that the direction of the resultant must be opposite to that of its components, and that the end views of the gears must be drawn on the same side as the force diagram. Thus, if the end of gear B was drawn on the opposite side (shown by the dotted lines) of the gear, the resultant radial load could not be directly transferred from the force diagram, but would have the apparent direction shown.

If in Fig. 15 the angle between the shafts become 90 degrees.

$$\beta + \beta^1 = 90 \text{ degrees.}$$

$$P_3 = P_4$$

$$P_4 = P_3, \text{ as in Fig. 17,}$$

while if the shafts are parallel

$$\beta = \beta^1 = 0.$$

$$P_3 = P_4 = 0$$

$$P_2 = P_1 = 0$$

$$P_1 = P_2 = 0$$

which will be seen to be identical with the spur gear diagrams, in which the thrust is 0 and the radial load on both gears equals P_1 .

We have seen that 4,250 pounds is the maximum pitch line load on the bevels, so that in Fig. 17 P equals 4,250 pounds and the radial and thrust loads are found to be as follows:

Pinion radial, 4,390 pounds.

Pinion thrust, 345 pounds.

Gear radial, 4,290 pounds.

Gear thrust, 1,035 pounds.

The load distribution on the bearings is shown in Fig. 18 for I, II, III, VI, and in Fig. 19, for VII, VIII.

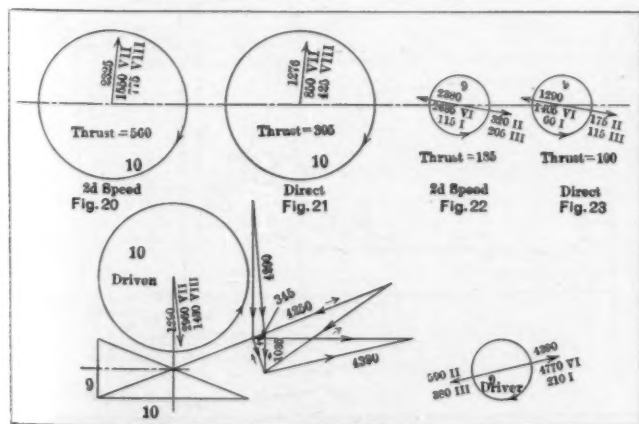
The maximum pitch line load of 4,250 pounds on the bevels occurs only on first speed and reverse. This pressure, on second speed, is equal to the tangential pressure on gear 3 times the ratio of the diameter of gear 3 to the diameter of gear 9.

$$1,970 \times \frac{4,666}{4} = 2,300 \text{ pounds}$$

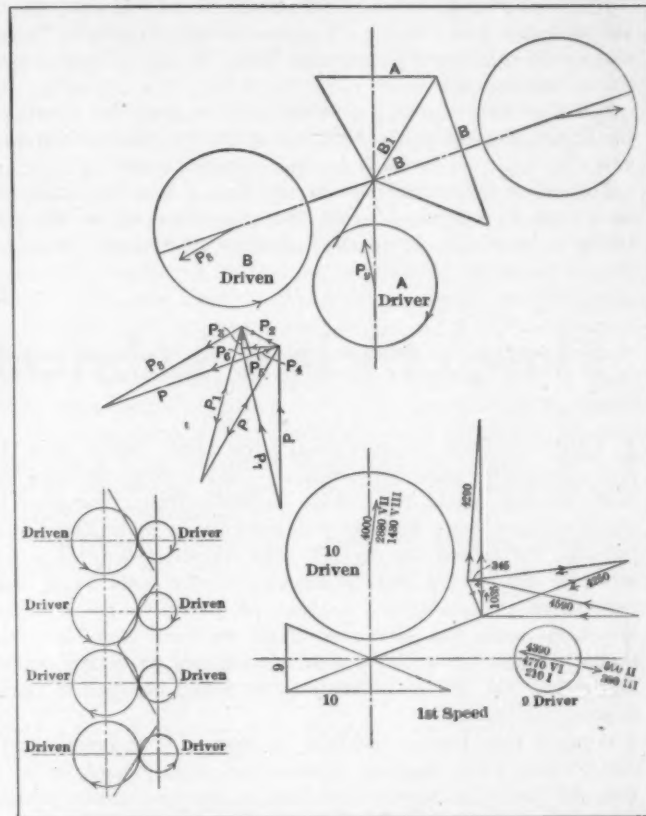
and on direct is equal to the turning moment of the motor divided by the radius of gear 9.

$$\frac{2,520}{.2} = 1,260 \text{ pounds.}$$

The bearing pressures due to the action of the bevels are proportional to the bevel gear pitch line tangential pressure, and as the forces act in the same direction they can be calculated and plotted from Fig. 17.



Figs. 20, 21, 22, 23 and 24—Differing pressures with varying speeds



Figs. 15, 16 and 17—Variation in thrust and radial load with angles

	DIRECT	2D SPEED	1ST SPEED	REVERSE OVER	REVERSE UNDER
I	60	560	600	840	900
II	175	1730	1880	2620	2860
III	115	1200	1150	270	590
IV	0	960	950	1100	1620
V	0	960	1860	2550	2820
VI	1405	3150	6150	7170	6150
VII	850	1550	2860	2860	2860
VIII	425	775	1430	1430	1430
Pinion Thrust	100	185	345	345	345
Gear Thrust	305	560	1035	1035	1035

Fig. 25—Tabular summation of all loads on each bearing

Fig. 20 shows the pressures thus obtained for VII and VIII, on second speed, and Fig. 21, the same bearings on direct. Figs. 22 and 23 show the loads on bearings, I, II, III, VI, for second speed and direct respectively.

The load distribution is quantitatively the same for reverse as for first speed, but as the direction of the forces are different, a new diagram must be made for this case, as in Fig. 24.

Figs. 25 is a further analysis of Figs. 4, 8, 9, 10, 11, 17, 21, 22, 23, 24, by means of which the summation of all the loads acting on each bearing on each speed is determined. It will be

noticed that bearing I on direct is affected by the bevels only, while on second speed it has loads imposed on it by the action of three different sets of gears; the constant mesh, second speed, and bevels. The resultants are found for each case and tabulated as in Fig. 25. Knowing the percentage of overload on reverse allowable for the type of bearing used, this will form a sound basis for the design of the gear.

From a close inspection of this table and the values given therein, which are the result of some involved figuring, the student of such matters will find a great deal to interest him.

How Efficient Lubrication Reduces Maintenance

LUBRICATION presents to-day the same fertile field for thought or experimentation as it did in 1832, 78 years ago, when General Morin, the famous French engineer, first gave the world the now comparatively well-known laws pertaining to that subject. From that day to this, little has been done of a constructive nature, the worthy attempts in that field being more destructive or spasmodic. Instead of clarifying the situation, this later work has served to cloud the real issue, and even to-day, instead of a world-wide propaganda of education, the lubricating men are more likely to be found engaged in purely commercial efforts.

When a man buys a building, he insures it, engages a caretaker, looks after painting, repairs and other things, so as to keep the factor of depreciation down to the very lowest possible point. At that, the amount set aside or figured for replacement is on the basis of a shorter term of years than this type of building has been known to last. So, it happens that finally a time comes when an amount has been set aside sufficient to replace the old building with a new one, and still the old building stands and is of use. In short, due to forethought and care, the building is available for several years' use or to produce income without a corresponding outlay.

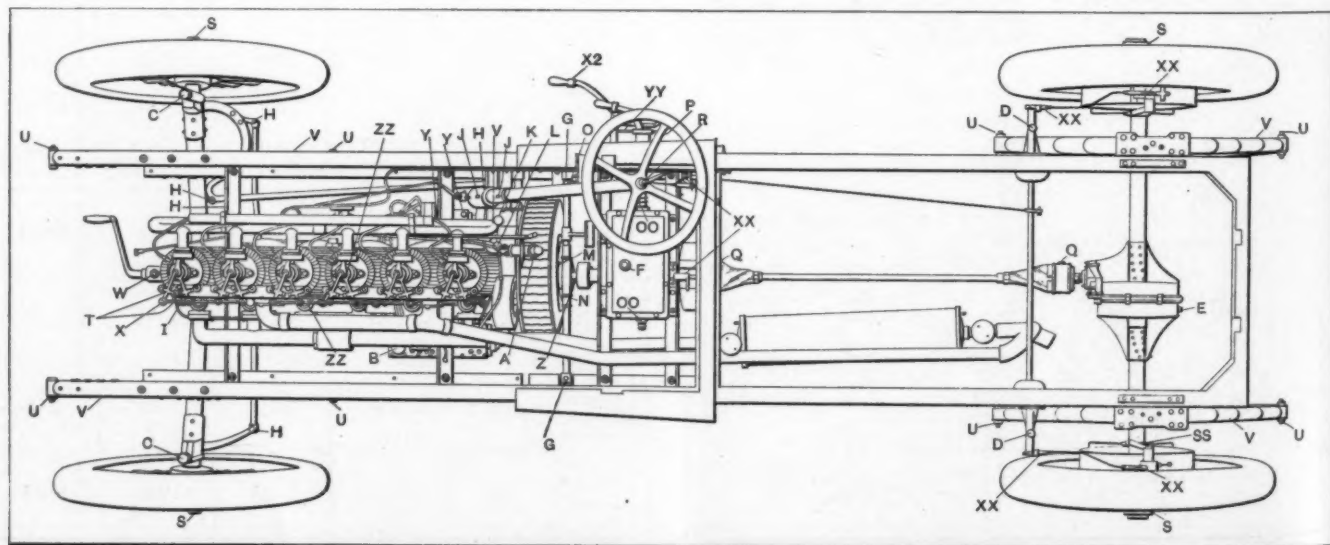
Why then is it that the same care and forethought is not applied to the purchase of some other class of realty, as, for instance, an automobile? Insurance, certainly; painting, surely; repairs, always; but care of the working parts, seldom. Under the heading of care should be included the most important item of all and by the same token, the most neglected, that of lubrication. By this is meant proper and complete lubrication.

This is a matter which may be capitalized in dollars and cents so as to show the owner of an automobile just what to expect for

each degree of outlay of time and money in lubricants and lubrication.

Thus, at the bottom of this page is shown a lubrication diagram of a modern automobile. In this, the points to be oiled or greased are indicated by means of arrows pointing to them, while each one is lettered. The frequency of lubrication may be tabulated referring to the points indicated and using the letters as there shown. It has in fact been done on the opposite page, although at a casual glance, it is not apparent. The various points needing lubrication have been gathered into a list and a value, or length of time which each part may run without lubrication renewal, assigned to each. This gives when plotted a line of frequency of lubrication, or curve of necessity. Necessity because if not heeded or avoided, rapid depreciation, or even accident, may be the ultimate if not immediate outcome. Now since experts differ and differ somewhat radically as to the exact mileage from any one part before a renewal of lubricant is necessary, there is some excuse for the liberties taken with existing figures, one maker's table being given on a later page.

These renewals being plotted give a curve from these needing lubricant attention at all times, that is to say, practically continuously up to those others, like rod ends, which need scant attention in the ordinary course of running. As opposed to this, another curve is superimposed in which the work done by each part is given a relative importance value, and the whole of these values plotted to form a curve. Since the number of rotations per unit of time varies from the engine through all connecting and interrelated parts back to the wheels, as well as in the parts which never make a full turn, but rotate say 45 degrees once in awhile, it is apparent that the importance varies with these turns. Probably the most important part, the crankshaft, has the highest



Lubrication Diagram of Franklin Automobiles, Shown to Illustrate Number of Points Needing Frequent Lubrication

speed of rotation, while parts of partial rotation may easily be classed as of least importance. This, then, gives a relative relation of the turning parts, based upon number of turns. As the latter in a measure marks the necessity of or for lubrication, it is both logical and correct to label this curve, as has been done, relative work done or relative importance of lubrication. In inspecting this curve, it will be noted that it has a hyperbolic form due to the fact that the lineal or surface speed inducing friction and wear of any rotating part varies as the square of the number of rotations.

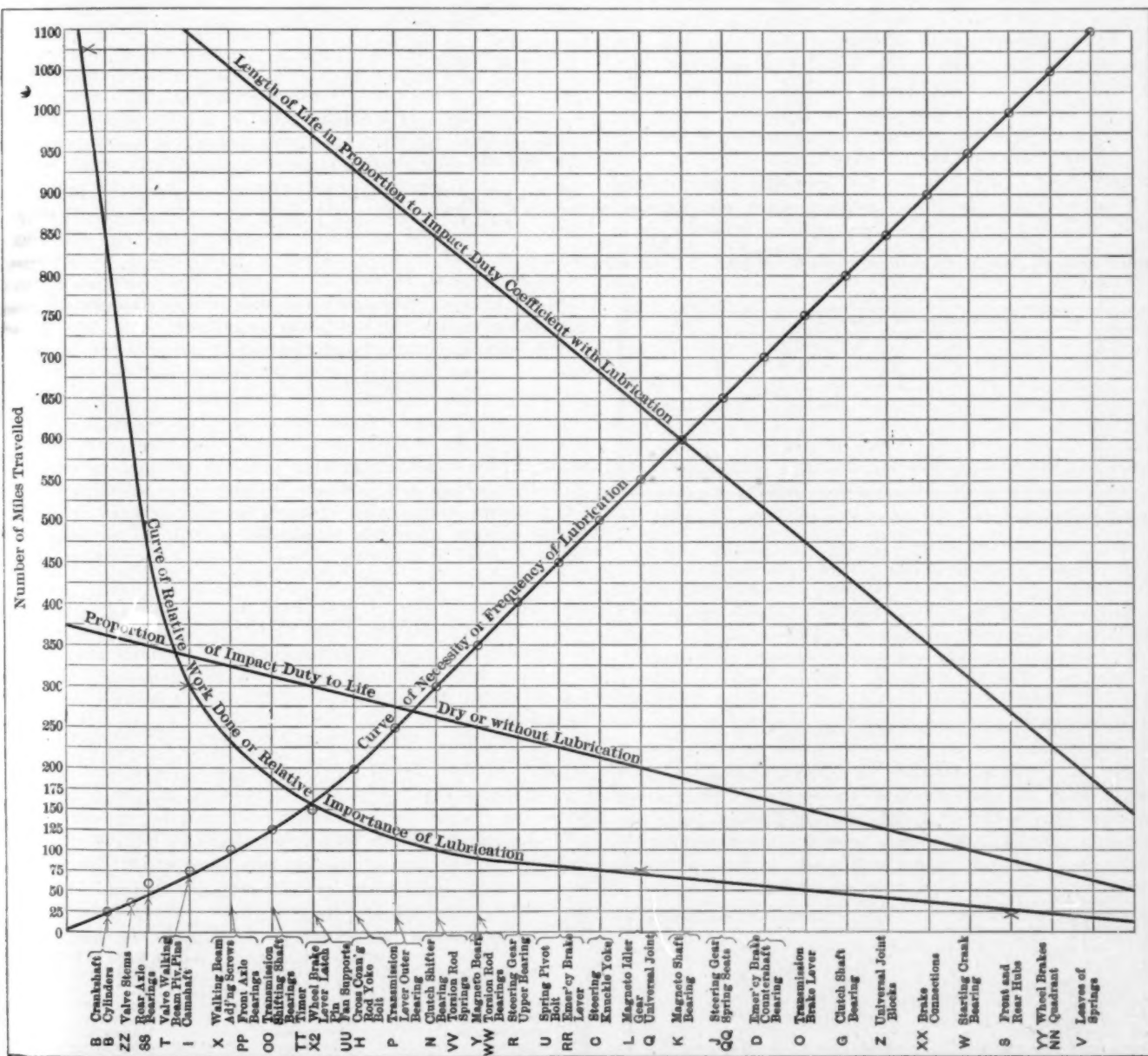
Of course, the nature of the curve, as just explained, is such that the highest point of the second curve is the lowest or starting point of the first. In other words, it is more important to always lubricate the crankshaft exactly on time, giving it an approximation to perfect lubrication, than it is to bother with the multitude of small and less important parts. This may be stated as follows: If you will neglect some parts, as to lubrication, by all means select those at the lower end of the second curve.

In this same chart will be noted a pair of additional curves. In plotting these, it was considered that the parts which make the greatest number of turns per unit time, and consequently,

total, are those which have the greatest amount of duty charged against them. This duty has a direct and very close bearing upon impact so that the matter may be represented as an impact-duty coefficient, which would not be an ultra-difficult matter to determine in any one given case. This could be determined as a numerical quantity for purposes of pure reasoning, or simply as a series of results, for more general use.

Moreover, it is apparent that every piece in the machine has a certain length of life, which may be increased by superior lubrication. This length of life bears some close relation to the impact-duty coefficient, in that the greater the duty and impact, the more the care given to the design, material, workmanship, and assembling of the part, to say nothing of the lubrication care. All these combine to give the part of greatest importance a longer life, or at least a relatively longer life, when account is taken of the impact-duty coefficient. So, it is that this curve, length of life in proportion to impact-duty, will be found to slope continuously from the parts of greatest work done down to those of least work. In short, the curve is a straight line from the crankshaft to the rod ends.

To emphasize the beneficial effect of copious lubrication, another curve has been figured and plotted on the same co-



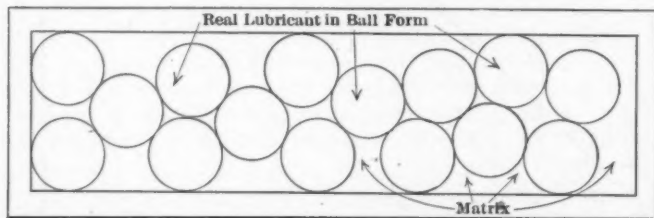
Curves Which Show Relation of Frequency of Lubrication to Relative Work Done and Impact-Duty-Life Coefficient

TABLE OF LUBRICATION ATTENTION NEEDED BY THE AVERAGE AUTOMOBILE CHASSIS

No.	PARTS	Lubrication	Give Attention	Miles	No. of Places on Chassis	No.	PARTS	Lubrication	Give Attention	Miles	No. of Places on Chassis
1	Front Hubs.....	Grease.....	.....	1,000	2	23	Emergency Brake Lever..	Oil.....	Every day...	....	1
2	Steering Knuckles.....	Grease.....	.....	200	2	24	Transmission.....	Oil (heavy-1" deep in case)	.....	....	..
3	Springs.....	Oil.....	Every day...	.....	2	25	Torsion Rod Spring.....	Oil.....	.....	300	1
4	Carburetor Primer.....	Oil.....	Every day...	.....	1	26	Torsion Rod Bearings.....	Grease.....	.....	300	1
5	Starting Handle.....	Oil.....	Every day...	.....	1	27	Torsion Rod Bearings.....	Grease.....	.....	300	1
6	Steering Rod.....	Oil.....	Every day...	.....	2	28	Ball Joints.....	Oil.....	.....	200	2
7	Fan Support.....	Oil.....	.....	300	1	29	Universal Joints.....	Grease.....	.....	250	2
8	Tie Rod.....	Grease.....	.....	200	2	30	Sliding Joint (Universal)	Grease.....	.....	250	1
9	Fan Bearings.....	Grease.....	Every day...	.....	1	31	Brake Bearings.....	Oil.....	.....	200	2
10	Springs.....	Oil.....	Every day...	.....	2	32	Brake Rods.....	Grease.....	.....	300	2
11	Springs.....	Oil.....	Every day...	.....	2	33	Brake Equalizer.....	Oil.....	.....	300	2
12	Valve Tappets.....	Oil.....	Every day...	.....	4	34	Brake Rod Ends.....	Oil.....	.....	200	2
12A	Rocker Shaft.....	Oil.....	.....	300	4	35	Brake Rod Ends.....	Oil.....	.....	200	2
13	Magneto.....	Oil (light).....	.....	500	2	36	Springs.....	Oil.....	.....	200	2
14	Magneto Connection.....	Oil.....	Every day...	.....	1	37	Brake Arm Bearings.....	Grease.....	.....	200	2
15	Magneto Bearings.....	Grease.....	.....	200	1	38	Brake Rod Arm Ends (upper and lower).....	Oil.....	.....	200	4
16	Steering Post.....	Grease.....	.....	750	1	39	Brake Rod Ends.....	Oil.....	.....	200	2
17	Timer.....	Oil.....	Every day...	.....	1	40	Rear Hubs.....	Grease.....	.....	1,000	2
18	Steering Post.....	Oil.....	.....	200	1	41	Spring Seats.....	Grease.....	.....	200	2
19	Clutch Bearing and Brake Pedal.....	Oil.....	.....	200	2	42	Rear Axle.....	Oil (heavy) to overflow.....	.....	750	1
20	Clutch Bearing.....	Oil.....	.....	200	1	43	Springs.....	Oil.....	Every day...	....	2
21	Clutch Ring.....	Oil.....	.....	500	1						
22	Gear Shift Lever.....	Oil.....	Every day...	.....	1						

ordinates as the one just described, this being the same proportion of life to impact-duty, but without lubrication. Being based upon the assumption that a crankshaft running 600,000 revolutions without lubrication would be absolutely spoiled beyond repair, it probably represents an extreme case, since one-tenth of this is more nearly the average case. This curve, too, is a straight line so that the difference in the slope of the two curves or the area between them represents the loss which a man will incur by just simply being careless. The combination of the four curves closely placed is worthy of some study.

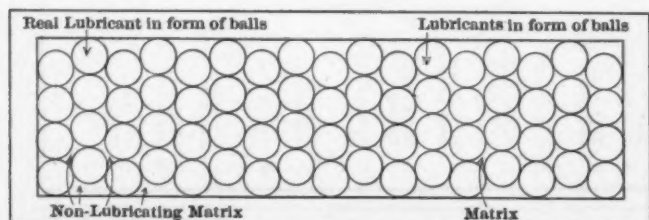
Lubrication as a subject is one that seemingly presents many angles, yet there are few things about it which will not yield to close application and study. Thus, speaking generally, there are two properties of all lubricants, in general, and oils or greases in particular, viscosity and body.



Imaginary Section Through Heavy Lubricant Showing Balls

The former, viscosity, is defined as that property by virtue of which lubricants form comparatively thick films between rubbing surfaces, thus permitting perfect lubrication. It has been defined by Davis as that property by which it clings to its own particles, or the degree of fluidity or resistance opposed to the separation of particles. This latter makes a difference between viscosity and adhesion, the latter being defined as the property of clinging to other particles than those belonging to itself.

The film spoken of as comparatively thick is in reality somewhat thin, having been measured by Reynolds as a minimum at .000375 in. in the case of a 4-in. diameter shaft, the bearing being larger by a radius of .00077, and the pressure being 100 pounds per square inch. Kingsbury in his experiments found the film to be of a thickness varying with speeds of from 80 to 190



Section Through Thinner Bodied Oil Illustrating Structure

revolutions per minute and loads of from 27 to 270 pounds per square inch from .00021 to .00023 inch.

These figures give some idea of the infinitesimal quantities, which are designated as comparatively thick. In the consideration of this film and the subject as a whole, a lubricant may be considered as a series of balls of one material, comparatively hard and resisting to some extent compression, these being encased in a body or matrix of non-lubricating or at least different lubricating qualities, the latter being very mobile. It is then conceivable that the shaft rolls upon the balls, the matrix simply serving to hold it together. Experimenters in this field find that the same lubricant often yields differing results in similar tests. held under identical conditions. Is it not conceivable that this anomalous result is brought about by a variation in the quantity of matrix present, as well as the number and character of the balls, as to size, comparative hardness, comparative density of balls in the matrix and some other quantities?

This idea, as advanced and illustrated in several cuts on this page, is offered more for future than for present consideration.

One essential condition of film formation is that the rubbing surfaces should have a slight inclination to one another. This is furnished in the ordinary case by the difference in size of the shaft and the bearing. But when it is not furnished, lubrication is both imperfect and inefficient. Under these conditions, the effect of the lubricant in reducing friction between the two bodies depends upon that indefinable quantity called body or oiliness. This is not, like viscosity, understood, definite and measurable, but is considered as intensified viscosity in that part of the fluid which is within the region of attraction of the surface of the molecules of the metal, that is to say, it partakes of the nature of adhesion and attraction at the same time.

One bad feature of body from a testing standpoint is that it may be hidden by the effects of viscosity, which perhaps accounts for the lack of knowledge of it. In any one case under test, using a good fitting journal and bearing, the friction is determined definitely by three things: speed, pressure, and viscosity. Varying any one and holding the others stationary will give a varying result, but in each case a minimum value may be obtained.

In one test which the writer calls to mind, with a varying speed and pressure, this minimum was found at 180 degrees F. having a value slightly greater than .0005. In this test another point was brought out, the interrelation of viscosity and body.

TEST SHOWING RELATION OF VISCOSITY TO BODY		
Increase of	Where Viscosity is Effective Coefficient of Friction	Where Body is Effective Coefficient of Friction
Pressure	Decreases	Increases
Speed	Increases	Decreases
Temperature	Decreases	Increases
Viscosity	Increases	Decreases
Body	.....	Decreases

As the table above brings out, the variations in the two are diametrically opposite, one increasing when the other decreases.
(To be continued)

Interesting Test of a Centrifugal Pump

GENERALLY it is the understanding that the efficiency of centrifugal pumps will depend upon shaping of the vane to such an extent that great skill frequently falls short. There probably is something in this under certain conditions, as when very large pumps are required to handle vast quantities of water under high heads.

The following report made by H. Rees, for the E. R. Thomas Motor Company, seems to indicate that the main care is to have the vanes smooth and the inlet free from obstructions. The capacity of the pump, under automobile conditions, will then be up to the requirement.

The first pump tested was with rough cast impeller, the results being shown on the data sheet. The impeller rotating in such a direction that the convex side of the bucket or vane was forward. As the results were so close to those of the third pump tested the curve was not plotted.

A pump with the impeller inlet smoothed out and running in the reverse direction, i. e., with concave side of bucket forward, was then tested with the result as shown by data sheet, test No. 2, and small circles on curve sheet.

The third pump tested was identical with No. 1, excepting that the impeller inlet and deflector were smothered up. The curve is shown by the characters X.

The fourth pump had an impeller made up of sheet brass, the buckets extending tangentially from a 7-16 circle and being driven as shown on the curve sheet.

From the experiments it seems that it matters little which way the impeller is rotated, but considerable is gained by using smooth blades and an unobstructed inlet.

MODEL M CENTRIFUGAL PUMP

R. P. M. of Pump	Test No. 1	Gallons Per Minute Test No. 2	Test No. 3	Test No. 4
225				Impending delivery
413		Impending delivery		Impending delivery
435			Impending delivery	
445	Impending delivery			
600	7.38	7.34	7.25	
750	...	9.2	9.34	9.35
900	11.7	10.9	11.3	...
1050	...	...	13.3	...
1200	15.1	15.9	15.7	16.7
1500	19.7	19.3	19.7	20.8
1800	23.0	25.5	23.6	...
1950	...	...	...	28.4
2100	28.3	26.5	27.2	...
2250	28.9	...	...	...
2400	...	31.6	32.9	35.2
2550	33.2	...	...	...

While the subject is up it will be opportune to settle one other point in relation to centrifugal pumps, using for the purpose tests from the same source. It is generally understood that the capacity of a centrifugal pump is as the square of the speed, and if this law holds, it follows that the amount of water delivered will be vastly more than the requirement at the higher speeds. The tests as follows will show just what is the relation of speed to delivery and that the square law does not prevail in small pumps as made for this purpose.

TEST OF A CENTRIFUGAL PUMP FOR A LARGE MOTOR

Head on suction side was maintained about 2 inches below top of radiator and head on delivery side about 6 inches above.

R. P. M. of motor	R. P. M. of pump	Head pumped against inches H. G.	Gal. pumped per minute
400	600	0.5	...
500	750	1.1	6.5
600	900	1.7	8.5
700	1050	2.3	10.5
800	1200	2.9	12.5
900	1350	3.5	14.5
1000	1500	4.1	16.0
1100	1650	4.7	18.0
1200	1800	5.3	19.5
1300	1950	5.9	21.0
1400	2100	6.5	22.5

Head pumped against given below means increase of delivery head over suction. The two heads being measured just before and after leaving pump. Pump would just circulate water at 400 revolutions of motor or 600 revolutions of pump.

TEST OF A SOMEWHAT SMALLER PUMP

R. P. M. of motor and of pump	Head pumped against	Gallons pumped per minute
400	0.5	...
500	0.5	5.8
600	0.5	7.5
700	0.6	9.5
800	1.0	11.5
900	1.6	13.4
1000	2.3	15.2
1100	3.0	17.0
1200	3.8	18.4
1300	3.7	19.5
1400	4.5	20.2
1500	5.2	20.5

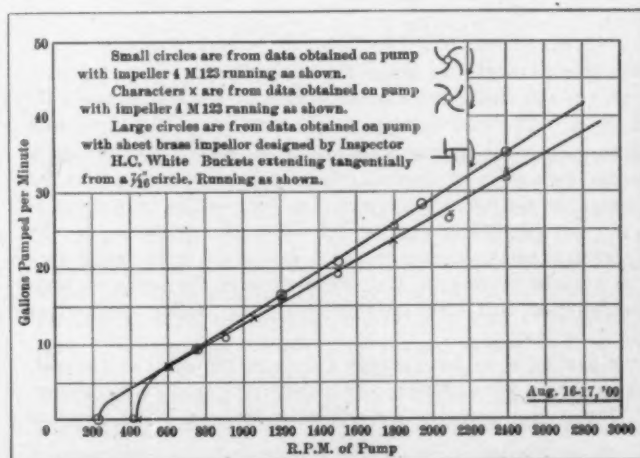
GEAR PUMP DELIVERY IN RELATION TO SPEED

R. P. M. of motor	R. P. M. of pump	Head pumped against inches H. G.	Gal. pumped per minute
100	150	0.5	4.5
200	300	2.0	9.5
300	450	4.0	14.5
400	600	5.7	19.0
500	750	7.2	23.5
600	900	8.8	27.5
700	1050	9.6	29.5
800	1200	10.2	30.5
900	1350	10.4	30.5
1000	1500	10.4	30.5
1100	1650	10.3	30.5
1200	1800	10.2	29.5
1300	1950	10.0	29.0
1400	2100	9.8	28.3
1500	2250	9.5	27.0

Neglecting delivery heads, the three pumps compared as follows:

R. P. M. of pump	Large centrifugal pump	Small centrifugal pump	Gear pump
100	...	...	2.6
200	...	...	6.1
300	...	...	9.5
400	...	...	12.8
500	...	5.8	16.3
600	...	7.5	19.5
700	6.0	9.5	22.5
800	7.3	11.5	25.1
900	8.5	13.4	27.3
1000	10.0	15.2	29.0
1100	11.0	17.0	30.0
1200	12.3	18.4	30.5
1300	13.5	19.5	30.5
1400	14.3	20.2	30.5
1500	15.0	20.5	30.4
1600	17.2	...	30.3
1700	18.5	...	30.0
1800	19.5	...	29.5

It will be observed that the gear pump performs admirably, excepting that noise must be considered at higher speeds, and, as the test shows, there is a certain falling off in capacity as the speed increases. Since the cooling requirement does not increase with speed to any great extent, it is only the noise that has to be considered, unless with gear pumps the wear is greater.



Test Curves of Thomas Model M Centrifugal Pump

An Improved Absorption Dynamometer*

By C. M. GARLAND, URBANA, ILL.

IN testing prime movers, the engineer often laments the dearth of efficient power-absorbing apparatus. Especially is this true in the testing of small high-speed machines, such as automobile engines and steam turbines. In many cases the number of machines to be tested is large; in fact, in some instances each machine is given a brake horsepower test before leaving the factory; and in every case where a high degree of reliability is essential from the output, the percentage of machines undergoing test must be large. The attention of the writer was forcibly called to this need several years ago in the testing of a small steam turbine running at 2,300 revolutions per minute, and through this experience the type of apparatus described below was designed and has been used with satisfactory results.

In the design of such a piece of apparatus the following points were to be considered. These are enumerated in the order of their supposed importance.

- a. It should be free from binding or "seizing."
- b. It should be free from producing changes in the load, due to changes in the apparatus itself, such as change of temperature, wear or friction of parts, etc.
- c. It should be capable of absorbing and accurately indicating a wide range of loads, from zero to the full capacity of the machine.
- d. The regulation of the load should be positive and instantaneous.
- e. The apparatus should require a minimum amount of attention and be capable of continuous service.
- f. It should be self-contained, occupy a small amount of floor space, and be free from noise and the splashing of oil and water.
- g. It should be capable of being quickly changed from one prime mover to another.
- h. It should require a small amount of cooling water.

In considering the above items, it will be noted that items a and b practically eliminate mechanical-friction apparatus from the field, while items b, c and d practically eliminate machines depending upon the friction or resistance of liquids for their operation. With these two classes of apparatus removed, there only remained the principle of magnetic induction for the construction of an efficient absorption dynamometer.

THEORY OF ACTION

From this principle we know that a conductor revolving in a field of variable magnetic intensity has an electric current induced in it. The reaction of this current upon the field that produces it causes a torque between the conductor and the field. There are two ways of dealing with the current induced in the conductor. In the one, the current may be collected by a commutator or slip rings and carried off from the machine; in the other, the current, or rather currents, generated in the conductor may be allowed to remain, and, circulating in the paths of least resistance, they will ultimately short-circuit among themselves and produce heat.

In the first case, we have simply a dynamo mounted in a cradle. This serves as a very efficient and satisfactory type of dynamometer. There are, however, objections to its use. The currents

generated must be taken care of either by water rheostats or lamp banks or utilized in the performance of work. Water rheostats and lamp banks require considerable attention and occupy space. Owing to the irregularities in the testing, the utilization of the current for the performance of work is in most cases impracticable. The initial cost of a testing unit of this type is necessarily large.

If the currents in the conductor are permitted to short-circuit themselves, the conductor is heated; the amount of heat produced

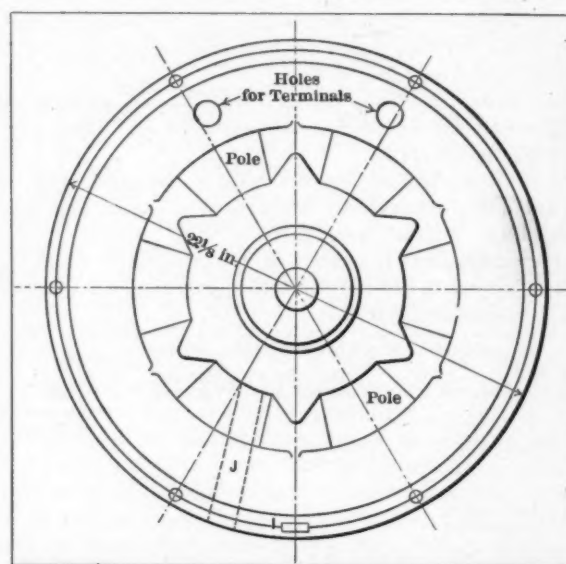


Fig. 2—Left half of field casting, Garland Dynamometer

is equivalent to the work absorbed by the dynamometer; and the heat thus generated may then be carried off by cooling water. This is the principle utilized in the design illustrated, a description of which follows.

DESCRIPTION OF DYNAMOMETER

In brief, the dynamometer consists of a metallic disc revolving between a set of pole pieces so constructed as to produce a magnetic field of variable intensity. Fig. 1 shows the front view of a machine designed to absorb 45 horsepower at from 1,200 to 1,500 revolution per minute. Fig. 2 is an end elevation and part section showing the construction of the dynamometer. It will be seen from this figure that it consists of a copper disc *A*, mounted on a bronze hub and revolving in front of pole pieces *B B'*. The magnetic circuit is made up of the casting *C*, the air gap and the cover plate *C'*. The castings *C* and *C'* are bolted together and carry the exciting coil *D* and the bearings *E* and *E'*. The magnetic yoke, made up of casings *C* and *C'* carrying the field coil and disc, is supported in ball bearings, and is prevented from rotating with the disc by the spring balance shown in Fig. 1. This latter measures the pull or torque between the rotating disc and the stationary yoke.

The magnetizing coil is encased in copper, the terminals being carried out through holes in the casting *C*, which are carefully sealed after the coil is in place.

The heat generated by the short-circuiting of the eddy cur-

* Paper read before the Boston meeting, American Society of Mechanical Engineers, March 11.

rents generated in the copper disc, is carried off by the cooling water which enters through the base connection at *F* (Fig. 2) and passes up through the bearings into the field casting. It then passes out through openings which are not shown in the illustration. This water not only carries off the heat generated, but serves as a lubricant for the bearings. That which passes through accumulates in the central chamber *E*, and is discharged at the base of the machine through the drains *G G'*.

Fig. 2 is a detail drawing of the left half of the field casting *C*, shown in section in Fig. 1. It will be seen that there are six poles in the machine. The circulating water enters at *I* and leaves through the port at *J*. Similar ports are provided in the cover plate *C*, Fig. 2.

OPERATION OF TEST

In operating, the engine under test is directly connected to the dynamometer shaft by means of some form of flexible coupling, the cooling water is turned on and the engine is started. After

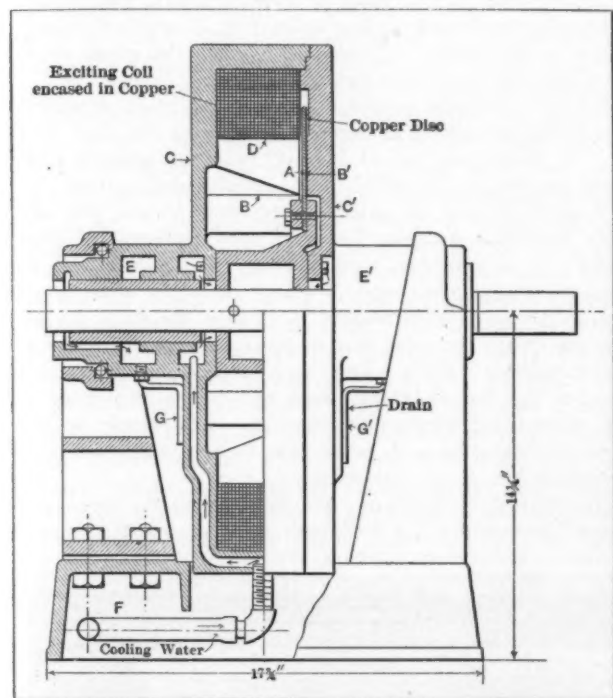


Fig. 1—Section through New Garland Dynamometer from end

normal speed is reached the load may be thrown on by energizing the field coil. The amount of current and consequently the torque or pull on the spring balance is regulated by a rheostat connected in series with the coil. After running a few minutes

the quantity of cooling water is adjusted so that the temperature of the machine does not exceed 150 deg. Fahr. In larger machines the coil may be wound with asbestos-covered wire and the temperature permitted to reach 212 deg., so that the cooling water is evaporated within the dynamometer. This reduces the quantity of cooling water required about 75 or 80 per cent.

The normal working temperature having been reached, the load on the machine remains absolutely constant, provided the line voltage is constant, for the mechanical friction, which is the bearing friction of the revolving disc, is small and practically constant, and changes in temperature due to changes in the supply of cooling water also affect the load on the dynamometer very little. The regulation by the rheostat is instantaneous and positive. When the dynamometer is driven by a smooth-running engine, the torque as indicated by the spring balance will not show a variation of 1-8 pound, while the balance is sensitive to less than 1-16 pound. This indicates an accuracy that is not necessary even in the most refined testing work.

RELATION BETWEEN SPEED AND TORQUE

In the case of the present machine the torque is almost proportional to the speed and is maximum at about 600 revolutions per minute. From this point the torque props off about 15 per cent. at 1,200 revolutions per minute, and remains almost constant from 1,200 to 1,500 revolutions per minute.

The torque depends upon the speed, number of poles, thickness of air gap, thickness of the copper disc, shape of the copper disc, and shape and spacing of the pole pieces. By varying the number of pole pieces, and the thickness of the copper disc, the point of maximum torque on the speed-torque curve may be shifted anywhere from 25 revolutions per minute to 2,500 revolutions per minute.

CONCLUSION AND RESULTS

This type of dynamometer is well adapted either for the testing of high-speed motors with a wide variation in speed, such as the automobile engine, or for the testing of slow-speed apparatus having a small variation in the speed. It can be built in practically any size from 10 horsepower up. The principal disadvantage is the high initial cost, although this is not an item where serious and continuous testing work is going on, as in factories or in the laboratories of technical schools, for the labor saved and the increase in capacity resulting through the use of the machine will in a short time more than pay for the initial outlay.

The efficiency, which may be expressed as the ratio of the energy absorbed by the dynamometer, minus the energy supplied to the exciting coil, divided by the energy absorbed by the dynamometer, may be made anything up to 99.9 per cent. and depends upon the weight of copper placed in the coil. Ordinarily the efficiency is made about 96 per cent., or 4 per cent. of the power absorbed by the dynamometer is required in the form of electrical power for excitation.

Electric Vehicle Operation Cheaper Than Horses

UNDER the above heading, the following masterly summary of the electrical vehicle situation was printed in a recent issue of the *Electrical World*:

"The investigation boils down to this: that in the case of the Commonwealth Edison Company, where a large number of electric power wagons and horse rigs has been employed side by side, the actual cost of operating the electric vehicles is shown to be sensibly less than that of operating the horse-drawn vehicle. The comparison has been made very carefully and thoroughly and the result is a triumph for the electric commercial wagon.

"Furthermore, the cost of operating electric vehicles is decreasing rather than increasing, whereas the reverse is true in the case of the horse-drawn rigs. The decrease in the case of

the electric type is due to improved construction, greater care in operation and decreasing cost of electricity. The increase in the cost of operating the horse wagons is largely to be ascribed to the constantly rising price of feed. The electric vehicle has the advantage also in that it presents a better appearance and makes for a cleaner, more sanitary city. In the matter of maintenance of pavements, also, the electric vehicle possesses a decided superiority. Weight for weight, the electric wagon will cause less deterioration of the pavement than the horse wagon, to say nothing of a substantial reduction in the cost of street cleaning where the electrics are employed. Again, the greater ease of control and compactness of the electric vehicles tend to relieve the congestion on the streets of large cities.



De Lesseps at the Wheel of his Own Monoplane, "Le Frégate"

ACCIDENTS, both to men and machines, marked the aeronautical meet at Heliopolis, Egypt, in the shade of the Pyramids, from February sixth to thirteenth, eight days of flying. Nearly all the accidents were due to the winds, which were unusually severe at times. Such spells of windy weather were followed closely by unusual calms, so that, taken all in all, it averaged up to good flying weather. The accidents to men totaled four, one being somewhat serious, while no less than six machines were seriously damaged, three of them being reduced to scrap.

Some of the accidents took place before the week of flying actually opened, so that the aviators were not only deprived of the use of their machines, and in some cases, the personal ability to manage a 'plane, but were obliged to sit by later and see others win valuable prizes. The latter were indeed liberal, being distributed over the single days, for each of which there was a prize of \$200, in speed, height, and distance, but also for the whole meeting, including as grand prizes the following: Prix de Baron Empain, for the greatest distance for a single unin-

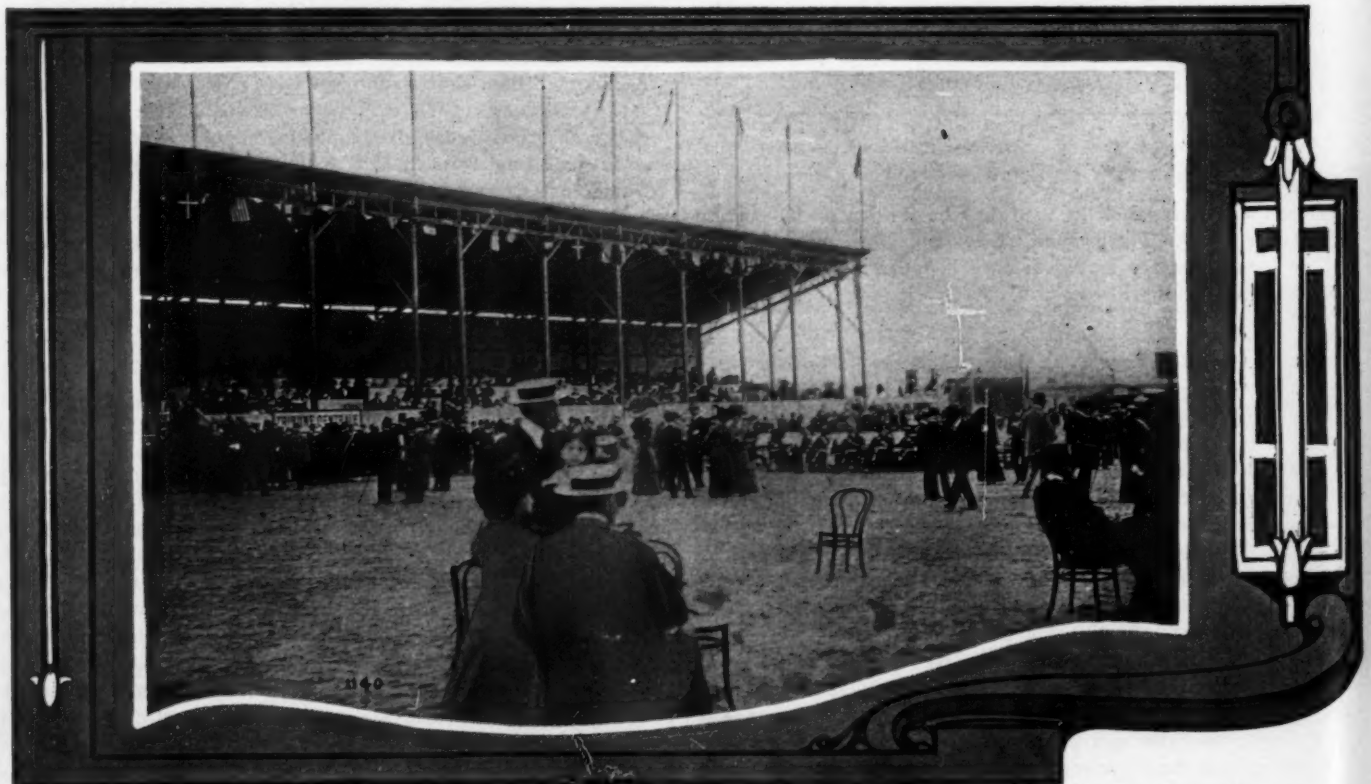


interrupted flight, \$10,000; second prize, \$2,000; third prize, \$1,000; fourth \$500; fifth, \$500 and sixth \$200. Then there was the Prix d'Heliopolis for maximum height; first \$10,000; second, \$2,000, and third, \$1,000. For the flight from Heliopolis to the Pyramids and return the prize consisted of a cup valued at \$400, and \$2,000 in cash added. Finally, for the greatest total distance for the whole week, made in official flights, the Grand Prix d'Egypte, amounting to \$5,000 for first, \$2,000 for second, and \$1,000 to the winner of third. All in all, the stakes were rich, amounting to more than \$40,000.

Of this Rougier gained the greater portion amounting to nearly \$19,000, which he secured by winning the Prix d'Heliopolis for height, the Grand Prix d'Egypte for greatest total distance, as well as a number of the smaller daily prizes.

Next to Rougier, the prize winners were Métrot, who won the Prix de Baron Empain; Le Blon, who captured the prize for speed over a measured 10 kilometres (6.21 miles), and Balsan, the fastest over a measured 5 kilometres. The latter was numbered among the unfortunates, in that on the third day of the meeting, when the wind was unusually severe, he was the only one to attempt a flight. This, as it turned out, was a foolhardy thing to do, for on his first turn an adverse wind bore him to the ground and wrecked the machine. Fortunately he was not injured personally, and, being able to secure another machine, continued his spectacular flights.

On the first of February, five days before the meeting, Mortimer Singer suffered a deplorable accident, which, coupled with a similar accident to Latham, served to call attention to a



General View of Crowd and Grand Stand at Heliopolis Aero Meeting. The Khedive of Egypt Was an Interested Spectator



hitherto overlooked item, the effect of eddy currents upon an aviator. This accident to Singer, and the similar, though fortunately less disastrous, mishap which overtook Latham flying at the same place on his Antoinette monoplane, have once more drawn the attention of aviators to the dangers attending flight in what appears to be a dead calm of the atmosphere. It will be remembered that the first serious accident which happened to an aviator using a motor on his flying machine was due to the same cause as those which have just occurred at Heliopolis, or at least it took place under similar circumstances. It was in perfectly still air that Henry Farman, flying at Issy-les-Moulineaux on the Voisin aeroplane with which he had, about a month previously, gained the Deutsch-Archdeacon prize by traveling in the air a kilometre out and home to his starting point, was capsize by a rising current which caught only one of the wings of his machine. At least that was the impression of the pilot, who was stunned by the fall and cut about the face by the wire stays of the aeroplane. Since then numerous aviators have experienced the inconvenience of the eddies which rise from the ground in an apparently still atmosphere. Those eddies or little whirlwinds are most treacherous, and experienced aerial pilots quite agree with Latham's opinion that it is less dangerous to confront a fairly strong breeze than to fly in a dead calm. However, when in a still atmosphere the aviator has risen to a certain altitude the danger from the eddies is less, if it is not entirely absent, firstly because those eddies widen out and lose much of their strength before they reach a great height, and secondly, because the pilot, if caught by one of them, has time to right



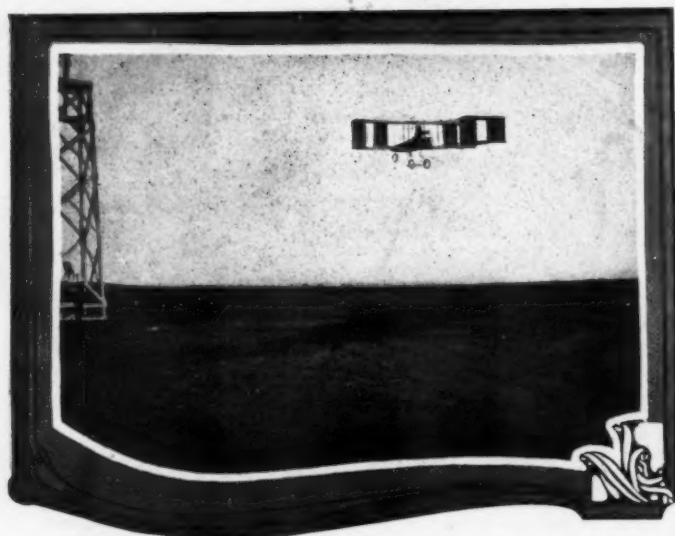
Goux, Voiturette Driver, at Wheel of Peugeot-Rossel Monoplane

his machine, which is not the case when flying at a few yards from the ground. Also, the greater the speed of a flying apparatus the smaller the danger of its being upset by an eddy.

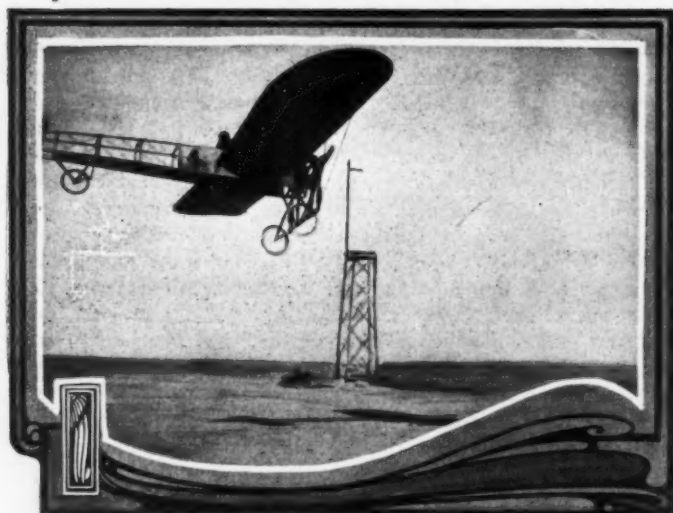
The proceedings on Wednesday, the ninth inst., were extremely interesting. More of the competitors actually figured in the contests than on any of the preceding days, and the spectators were delighted by witnessing Duray, the famous motorist, break the world's record for five kilometres. His time for that distance was 4 min. 12.4-5 sec., and his machine a Farman biplane. The daily speed prize of \$200, for a distance of ten kilometres, was won by Balsan (Blériot) in 9 min. 50.2-5 sec. Another feature of the day's proceedings was the appearance of Latham, who won the \$200 prize for altitude, he attaining the height of 170 feet. The daily prize for distance was secured by Métrot on a Voisin biplane, who covered 85½ kilometers (57.2 miles). The day did not pass without an accident, for Hauvette-Michelin was wheeling his Antoinette monoplane into its shed when the machine toppled over and smashed a wing. Hayden Sands, an American, driving an Antoinette monoplane, succeeded



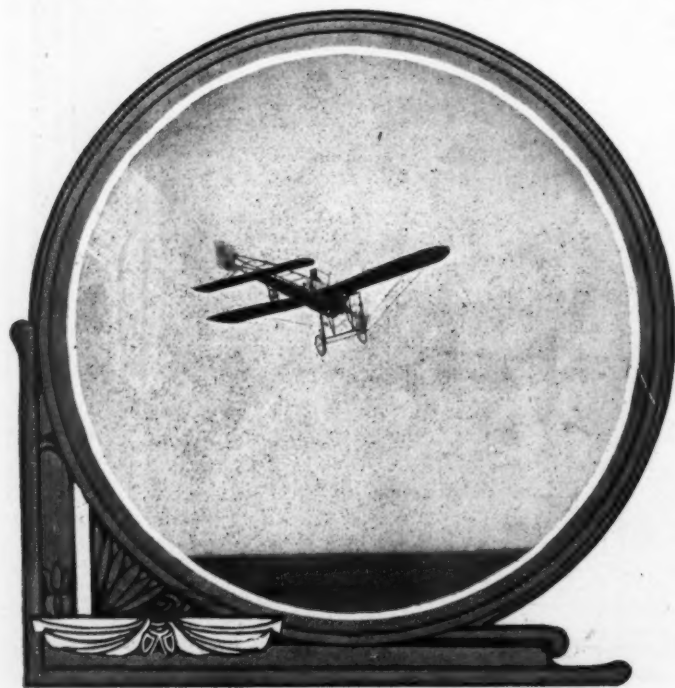
Wreck of Hauvette-Michelin's Antoinette Monoplane, Overturned on Wednesday in Front of the Aero Garages



Métrot in Voisin Number Ten at One of the Corners

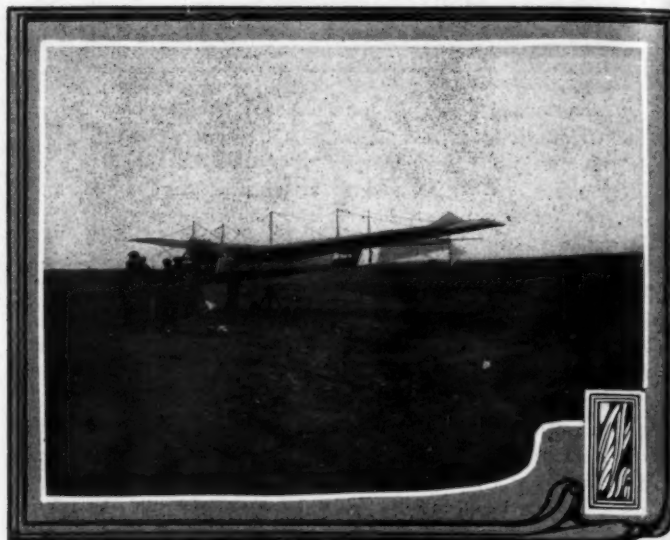


Near View of Le Blon in Blériot Four from the Rear



Le Blon in Flight Well in the Air. Blériot Number Four

in making a notable performance by flying five kilometres in 4 min. 22 sec. He was, however, not competing officially. Owing to the unfavorable weather there were no flights of importance on the tenth inst. In the morning Mme. Delaroche secured a pilot's license from the French Aero Club by flying four times round the course, a distance of over twelve miles. She is the first woman to win the distinction. On Friday, the eleventh



Latham and Antoinette Number One on Ground

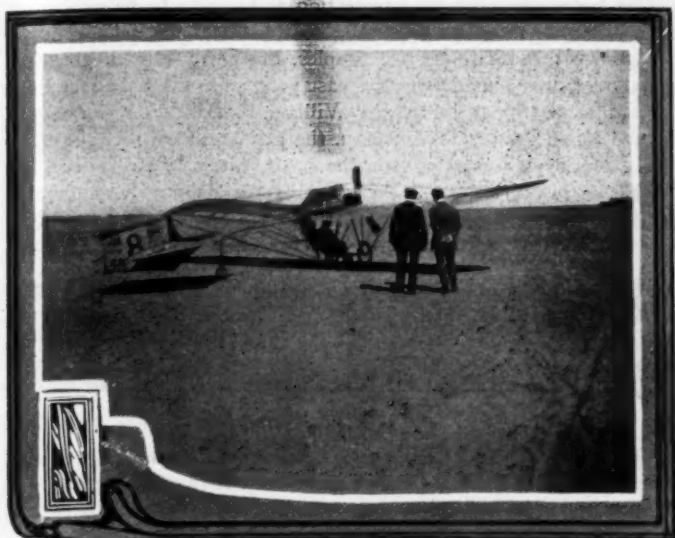
Details of New Darracq

PARIS, March 7—The construction of aviation motors has already attained such proportions that few automobile manufacturers can afford to ignore it. Thus it is not surprising to find that a firm of the standing of Darracq has also produced a light-weight for work in the air. A start was made by a request from Santos-Dumont for a two-cylinder horizontal capable of developing 30 horsepower for more than a few minutes, and not exceeding $4\frac{1}{2}$ pounds per horsepower. Such a motor had been produced, but had never been capable of running at full power for any length of time. The preference for a two-cylinder horizontal was by reason of its shape, allowing it to be placed in the angle of the wings of a monoplane with a lower center of gravity than with vertical cylinders.

There is nothing very extraordinary in the general design; indeed, it is what Designer Ribeyrolles calls a retrograde motor, for the horizontal type was abandoned in France almost before it was given a fair trial. But there is considerable ingenuity in the working out of details and in the abolishing of parts hitherto considered necessary, with a consequent reduction in weight. The two cylinders, having a bore of 5.1-10 inches and a stroke of 4.7-10 inches, are machined out of the solid bar of steel until their weight is but 84.5 pounds complete. The head is separate, carrying the seatings for the inlet and exhaust valves, is screwed onto the cylinder, and then welded in position. A copper water-jacket is fitted, and it is in this condition that the weight of 84.5 pounds is obtained. Steel pistons are employed, with light rods connecting up to a two-throw crankshaft.

The distinctive feature of the motor is to be found in the valve operating mechanism. There are but two pinions, two shafts, and two cams in the entire motor. On the main shaft is mounted a driving pinion with a slight bevel, meshing with the two-to-one pinion, the shaft of which carries the two cams, drives the magneto and the water circulating pump. The plunger type of lubricating oil pump is operated by an eccentric machined with the bevel gear on the main shaft. The reason for employing bevels in the timing gear is to avoid the use of an intermediary gear between the driving and the driven shaft, the mag-

inst., Rougier carried off the distance and altitude prizes, while Le Blon on a Blériot monoplane secured the speed prize by flying ten kilometres in 8 min. 74-5 sec. At one time there were three aviators—Rougier, Le Blon and Grade—in the air. There were no flights on Saturday owing to the violent wind, but on Sunday Balsan established a new record for five kilometres by flying that distance on his Blériot in 4 min. 1 sec.



Grade (German) Monoplane Ready to Start Flying

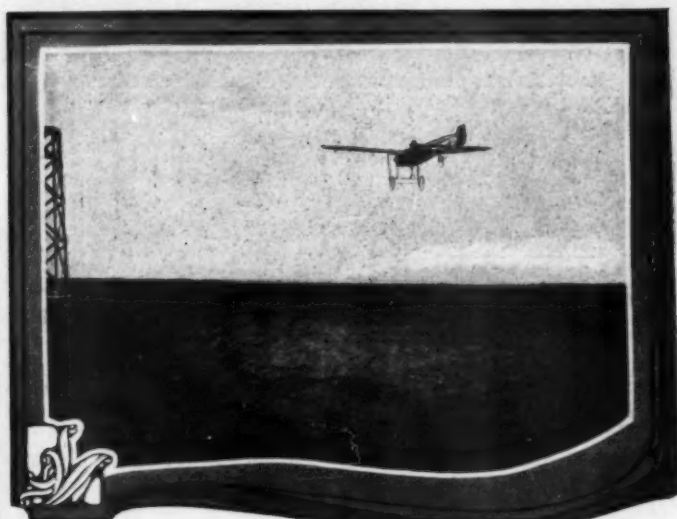
Light Aviation Engine

neto necessarily being set too high to take the drive in the ordinary way. The push rods are not parallel, but gradually come together until they almost touch, this being necessary because of the placing of the two cams very close together on a short shaft. One cam operates two inlets and the other two exhaust valves.

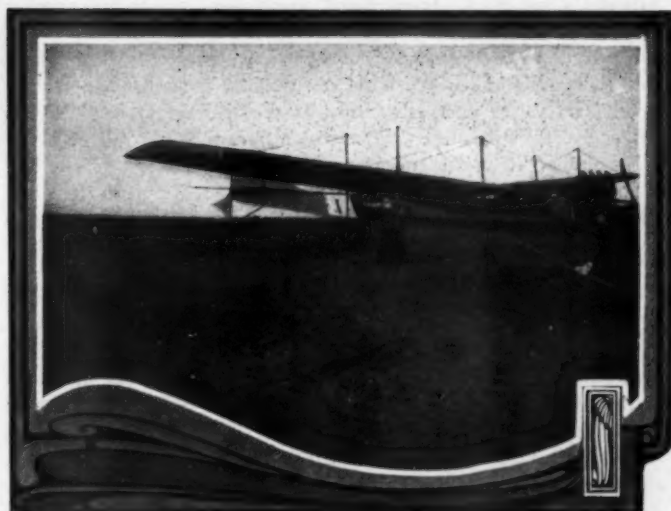
Rocker arms are drilled to reduce weight, and the push rods are steel tubes with lock-nut adjustment to allow for wear. The spindle on which the two rocker arms are mounted is a steel tube passing directly into the cylinder and provided with a priming cock, thus fulfilling two functions without any increase of weight. The spark plug is mounted in the cylinder head midway between the two valves.

The carbureter is original by reason of the manner in which it is mounted. It is constructed of aluminum, and is of the float-feed type, the mixing chamber being cast with a sleeve fitting round the straight length of intake pipe uniting the two intake ports. A single vertical jet passes into the mixing chamber, and is heated at its base by a bypass from the exhaust. An additional air valve is fitted in the head of the mixing chamber, but in view of the fact that auxiliary exhaust ports are provided, is only given a very slight opening, a large quantity of air of course entering through the exhaust ports. A series of ten exhaust holes are bored in the cylinder at the end of the stroke, and occupy almost one-half the circumference. They are surrounded by an aluminum collector, the mouth of which is turned in the same direction as the main exhaust ports, thus allowing a manifold and a muffler to be fitted without difficulty, if desired.

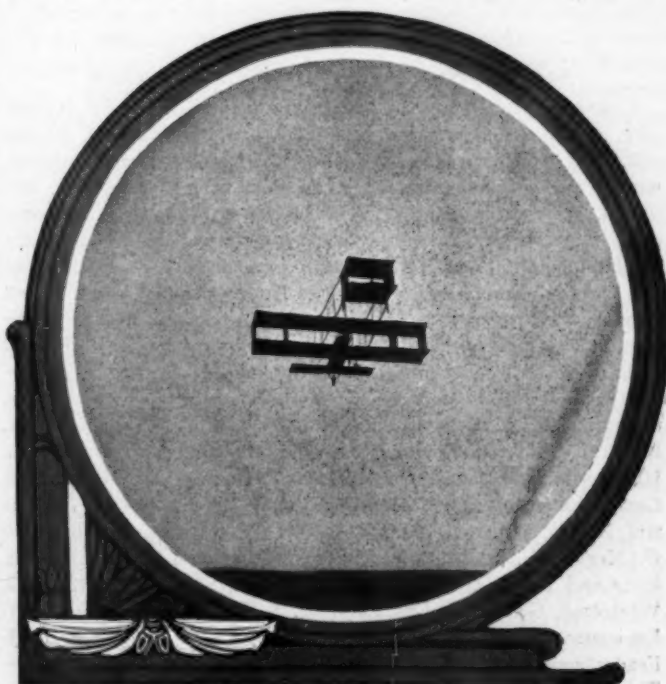
On the bench, the motor has furnished 34 to 35 horsepower without any falling off in power at the end of a long run. Fitted complete with lubricating oil for three hours, water, magneto, carbureter, but without gasoline, its weight is 121 pounds, thus securing the very unusual result of less than 4 pounds per horsepower. A similar type of motor, with four horizontal cylinders, has also been produced and is being used for the first time on a Voisin biplane driven by Rigal, the automobile race driver.



Balsan, a Winner, at a Corner Post with His Blériot



The Unfortunate Latham About to Arise in His Monoplane



Métrot, Another Winner, in Full Flight. Voisin Biplane



QUAKERS TO HAVE MANY ROAD EVENTS

Philadelphia automobilists are arranging for coming competitive events, including endurance and roadability runs, hill climbs, etc.—these to take place not alone in the Quaker City, but within 150 miles. This year the season will be opened with a three day roadability run of the Quaker City Motor Club to Atlantic City, N. J., from April 30 to May 2. It is expected that fully 100 cars will compete for the prizes in this event. Through a plan evolved by the secretary, Harry Harbach, there will be a prize given for each car that goes the route. A two day show of the competing cars at the Million Dollar Pier at Atlantic City, will form part of the program.

A number of local enthusiasts will enter cars for the big Harrisburg Motor Club run occurring in the first week in May. This run will in all probability end in Pittsburgh, and owing to the difficult route and strict conditions for which the Harrisburg Club contests are notable, the contest will be well worth while.

There will be the usual outpouring of Philadelphia car owners at Wilkesbarre next June at the contest known as the Wilkesbarre hill climb. An additional attraction will be that feature of the program embodying two events open only to the members of the Quaker City Motor Club. On Fourth of July and Labor Day, meets are arranged as usual.

President L. D. Berger, of the Quaker City Motor Club, has announced the personnel of that organization's Contest Committee, as follows: R. C. Ross, chairman; Fred C. Dunlap, A. T. James, G. Hilton Gantert, Paul B. Huyette, Evans Church, George M. Graham and A. E. Maltby.

NEW ADMINISTRATION FOR K. C. AUTO CLUB

KANSAS CITY, Mar. 14—The Automobile Club of Kansas City, under a new administration, headed by Frank P. Ewins, will carry on the progressive policies of former administrations, with a few original plans of its own. The new president, Mr. Ewins, who succeeded W. W. Cowen, is prominent in motor circles. Permanent headquarters were opened March 1 in the Midland Building, where Secretary Stevens will have his office and where members will at all times have a place of meeting and bureau of information. Following is the committees for the present year: Finance—D. E. Gudgell, chairman; C. V. Purcell and Dr. E. M. Hetherington. Membership—H. T. Fowler, chairman; W. G. Whitcomb and F. E. Lott. House—F. P. Ewins, chairman; H. T. Fowler, Fred C. Merry, A. W. Peet and L. H. Fisher. Auditing—Edward F. Webster, chairman, Dr. G. L. Henderson and Charles H. Moore. Racing—Dr. F. George Curtis, chairman; H. E. Rooklidge, R. E. Wiles, Carl J. Simons and R. M. Rigby. Good Roads—W. W. Cowan, chairman, F. C. Merrill, F. E. Lott, R. E. Bernheimer and J. M. Davison. Runs and Tours—W. G. Coumbe, chairman; H. N. Strait, W. G. Whitcomb, George H. Davis and W. J. Kupper (hotel manager). Legislation—W. F. Guthrie, chairman; M. M. Sweetman, B. J. Fradenburg, H. G. Blakely and B. E. Nace. Entertainment—Fletcher Cowherd, Jr., chairman; A. J. Davies, J. R. Mercer, R. H. Collins and E. H. Jones. W. F. Guthrie, counsel.

NEW OFFICERS FOR NUTMEG A. A.

NEW HAVEN, CONN., Mar. 14—At a meeting of the Connecticut Automobile Association held Friday afternoon at New Haven, Conn., the following officers were elected for the ensuing year: President, F. T. Staples, Automobile Club of Bridgeport; vice-president, John N. Brooks, Litchfield County Automobile Club; secretary, Philip E. Curtis, of Automobile Club of Hartford, and treasurer, C. H. Gillette, of the Automobile Club of Hartford. The home office of the association is by vote to be established permanently in Hartford owing to the fact that that city is the capital of the State. F. T. Staples, the newly elected president, was vice-president during the past year and now holds the office made vacant by the death of William F. Fuller some time ago. John N. Brooks, of Torrington, the newly elected vice-president, has served as secretary for the past year. C. H. Gillette, the treasurer, was a former secretary of the American Automobile Association. The membership of the State body is now about 900. The next meeting of the directors is to be held March 18.

SHOW BREVITIES

SIoux CITY, IA., HAS ITS FIRST SHOW

SIoux CITY, IA., Mar. 14—An unprecedented crowd of more than three thousand people packed the Auditorium on the first night of the automobile show, which opened March 1, and tried in vain to inspect all the exhibits. Every exhibit was in place at the opening hour, and every foot of floor space was occupied. Grecian pillars mark off the spaces, each being topped with a potted plant and signs with the names of the cars exhibited. Over each space hangs a sign of uniform size and lettering announcing the name of the firm. The scheme of decoration has been carried out thoroughly and artistically.

The cars exhibited are the Inter-State, Reo, I. H. C., Ford, Rambler, Buick, Velie, White, Knox, Cadillac, Stevens-Duryea, Baker Electric, Cartecar, Lambert, Apperson, E-M-F, Mitchell, Chalmers, Hudson, Overland, Marion, Jackson, Fuller, Firestone-Columbus, Maxwell and Thomas. Motorcycles and accessories are also prominent in considerable numbers.

Dr. F. A. Seemann, president of the Sioux City Automobile Club, which organized the show, has expressed himself enthusiastically over its success, and declares that annual shows are now assured in Sioux City. All the dealers who are taking part radiate smiles as they see their dreams materialized. In fact, the reality exceeds even the dreams.

TOLEDO WILL HAVE AN OPENING WEEK BUT NO SHOW

TOLEDO, Mar. 14—Toledo will have no automobile show this year but instead will have an "opening week." This has been definitely settled upon by the Toledo Automobile Dealers' Association, and the week beginning March 28 has been determined upon as the least conflicting with other similar displays in the country. Although having formerly decided to have a show beginning the same date and in the Coliseum where the show was held last year, the plans were altered on account of lack of room, that hall being much too small to afford space asked for within a few hours after the date of the show had been arranged. Under the new arrangement, each dealer will be limited as to the space he may occupy, only by his own quarters or by those which he may be able to lease. Practically all the vacant store rooms available have already been leased and arrangements thus far agreed upon call for displays on a much more magnificent scale than ever undertaken in this city heretofore, although the various displays will not be under one roof. Several new factories for the manufacture of automobile accessories are being or are about to be built in this city, all of which owe their removal to this city to the activity of the Willys-Overland company, which has more than doubled its number of employees during the past two months, the total number of which is now in excess of 3,000.

WINDY CITY WHEEL TAX UNPOPULAR

CHICAGO, Mar. 14—The wheel tax of two years ago, which has proved so unpopular, and has aroused so much protest on the ground that it is harmful to the sport, because it is unequal, is now up again for discussion. As matters stand now, motor cars are taxed on seating capacity, which works a hardship on the little fellow in that the owner of a \$500 car has to pay as much wheel tax as does the man who drives a 70-horsepower, seven-passenger car, providing the little fellow has a rumble seat and is capable of carrying three passengers. But this is not all. The drivers of horse-drawn vehicles are favored in the taxes in that their rates are not half as much as the motorists'. A single-horse rig pays \$5 per year, a two-horse rig \$10 and a three-horse \$15, while the smallest sum the motorists can get out for is \$12 on a two-passenger machine. Added to the inequality in the rates the motorists are complaining of another clause in the law which allows each city, village or township throughout the State to impose a wheel tax if it so desires. If any number of these

ROAD BUILDING NEWS

A. C. OF PHILADELPHIA ACTIVE IN GOOD ROAD WORK

PHILADELPHIA, Mar. 14—Few organizations in this country whose efforts are not wholly directed to the making and maintenance of good roads, are doing more along this line than is the Automobile Club of Philadelphia. And this despite its activities in sign boarding routes, map and road-book making and in forwarding legislation favorable to automobilists in general. Its apparent disinterestedness and "for-the-good-of-all" policy, however, is well worth while, for each succeeding month sees several scores of additional members on the rolls; so that having attained its ambition of reaching the thousand mark, the membership committee is now aiming to reach the 1,500 point, which, at the present rate of progress, should be attained by the middle of 1911.

Besides its work on the Delaware Water Gap route, whereby a 33-cent toll extortion was forever sidestepped and a good bit of road laid down where a quagmire formerly existed, the Club's Good Roads Committee is spending money here and there along the Philadelphia-Baltimore route, eliminating the bad spots until it is hoped that in a few months there will be a direct route between the two cities, via Perryville, that will do away with the long detour via Lancaster.

But the Club's most recent work and the most beneficial to a great majority of Philadelphia's automobilists, is its labor toward putting the old Haverford-Conestoga road in good shape for motor travel. This road parallels the old Lancaster pike, which, although always in tip-top condition, is anathema to all motorists by reason of its numerous toll-gates. Upon the completion of this work—and the club is now busily engaged in raising the necessary \$2,000 to finish it—automobilists will be enabled to keep their coats buttoned, and be forever released of the necessity of constantly digging into their jeans.

Not content with the carrying out of these important projects, the Good Roads Committee has been agitating the dragging and rebuilding (where necessary) of the bad 10-mile stretch of the Lancaster pike, which lies beyond the toll zone, near Gap and Bird-in-Hand.

W. O. Griffith, chairman of the Club's Signboard and Touring Committee, attended the organization of the Inter-County Good Roads Association at Coatesville last Friday and not only announced that Philadelphia had \$500 ready to hand over when wanted, but that the Automobile Club of Delaware County pledged itself to contribute \$200 toward the work. This was followed by the announcement of the Lancaster Automobile Club, through Dr. Donald McCaskey, that it could be drawn on to the extent of \$2,000 to carry out the project.

LAW AND THE
AUTOMOBILE

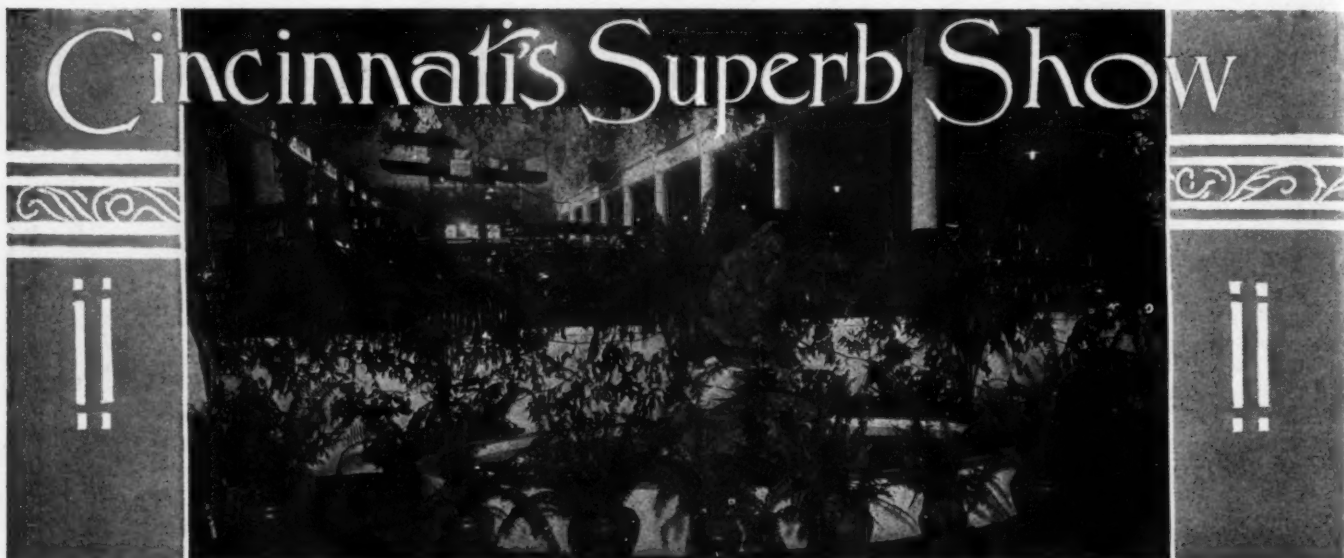
did so it would mean the death blow of motoring in the State of Illinois, for there could be no touring unless at great expense, for motorists would have to pay out a small fortune in wheel taxes just to cross the State. The supreme court of Illinois has upheld the validity of the wheel tax, and while the motorists feel that they are right in their contention that such a law is unconstitutional, yet they believe they can obtain some relief by first having the city council of Chicago revise the wheel tax and cut the figures in two and later go down before the State Legislature and pass an amendment whereby it will be impossible to impose more than one wheel tax on any one person. The Chicago Motor Club has taken up the cudgel and is preparing to appear before the license committee of the city council, which is to meet Friday afternoon, at which time the club will ask that the rates be revised, taxing on horsepower instead of seating capacity, and making the fees \$6, \$8 and \$10 instead of \$12 and \$20, as they now are. They also want to have something to say in the future regarding the expenditure of this money, desiring that the city provide suitable exits in order that tourists may get out of town without having to travel miles over poor pavements. Every day during one recent week mass meetings were held at the Chicago Motor Club headquarters in the New Southern Hotel which have produced many recruits, so that in all probability an army of determined owners will swoop down on the aldermen.

CAMPAIGN FOR ADOPTION OF FEDERAL REGISTRATION

That the automobilists of the country keenly realize the necessity for the Federal registration of automobiles has been well illustrated as a result of the recent legislative convention held in Washington under the auspices of the American Automobile Association. The strong plea made at the hearing in Washington before the Committee on Interstate and Foreign Commerce, which is now considering the Federal Automobile Bill, has been productive of most beneficial results in all of the large State associations and the more important clubs affiliated with the American Automobile Association.

A strenuous campaign has been inaugurated by many of the leading clubs, and particularly throughout the State of Illinois, toward impressing upon the members of the committee the great value of this National Registration Bill to the automobile industry at large, which has now come to be one of the greatest commercial interests in the country. While it is recognized that the benefits to tourists traveling from one State to another will be immeasurably improved by the adoption of this bill in Congress, the fact is also admitted that it will directly and indirectly aid every department of motoring, whether for business or pleasure.

The deep interest shown by the members of the Committee on Interstate and Foreign Commerce, and their admission that the broad principles of the bill were just and reasonable, have been a great encouragement to the active motorists who have been working for equitable laws on this basis during the last three years. Some minor changes to the bill have been deemed advisable and these are now being made, and the bill as amended will shortly be ready for definite action by the committee.



Fountain at Entrance to Music Hall, Where Cincinnati's Second Show Was Held, Amid a Profusion of Palms

CINCINNATI held its second annual show in Music Hall, the city's largest auditorium, and that the move was a wise one is evidenced by the 31,363 square feet of space sold to exhibitors. The hall was attractively decorated with pergolas of Doric columns, covered with Southern smilax, and potted palms and other semi-tropical plants were set about in profusion. Some fifty concerns exhibited 170 automobiles, besides many accessories. The aeroplane, without which no show seems to be complete this year, occupied a prominent position, and was accompanied by a small spherical balloon. The show was under the auspices of the Automobile Club of Cincinnati, with Rutherford H. Cox acting as general manager. Many sales were reported, and the dealers and manufacturers who participated seem well satisfied with the results. There can now be no doubt that the show will be an annual fixture. The list of exhibitors follows:

Atlas Motor Car Co., Interstate; Auto Jack Distributing Co., automobile jacks; Avondale Auto Supply Co., accessories; Louis E. Bedinger, Ferro marine engine, Mullen steel boats, K-W magnetos; Chas. Behler Sons Co., Brush, Maxwell, Columbia, Bailey electric; Buckeye Motor Car Co., Parry; Bumiller-Remellin

Co., accessories; Cincinnati Automobile Co., Peerless, Pope-Hartford; Cincinnati E-M-F Co., E-M-F Thirty, Flanders Twenty; Citizens Motor Car Co., Packard; Coughlin & Davis, accessories; Covington Auto Co., Cole 30; Crown Auto Co., Cadillac; Robt. C. Crowthers, Elmore; L. C. Dennison, Winton Six; Enger Motor Car Company, Enger; Franklin Automobile Co., Franklin; Ford Motor Car Co., Fords; Garford Truck Co., Garford trucks; J. K. Gilchrist, Demot, Detroit-Dearborn; Haberer & Company, Cino; Hanauer Automobile Co., Pierce-Arrow, Locomobile, Corbin, Jackson, Heilman Auto Co., Haynes, Cartecar; Herald-Reo Co., Reo; Hersenede Motor Car Company, Courier, Stoddard-Dayton, Rauch & Lang Electric Rapid truck; Junglas Auto Co., The Mitchell, Palmer-Singer, Baker Electric; Leyman-Buick Co., Buicks; Lexington Motor Car Co., Lexington; Metal Stamping Co., wind shields; Middleby Auto Company, Middleby; Geo. C. Miller Sons Carriage Co., Stevens-Duryea; Milton Motor Cycle Co., motor cycles; Ohio Motor Car Co., Ohio; Olds-Oakland Co., Olds, Oakland; Oskamp Auto Supply Co., accessories; Paragon Refining Co., oils and greases; Payne Motor Car Co., Thomas; Peerless Buggy Top Co., tops; J. H. Ratliff Auto Company, Chalmers Hudson; Special Motor Vehicle Company, Schacht; Chas. Schlear Motor Car Company, Hupmobile, Velle 40, National, Warren-Detroit 20; Schumacher, Boye & Emmes, Knox, Knox truck; Sheldon Axle Co.; Smith-Eggers Co., Stearns; Speedwell Motor Car Agency, Speedwell; Standard Oil Co., lubricating oils; Staver Motor Car Co., Staver-Chicago; Ferd. Stenger, Motor Cycles, Merkel, R. S. Pierce; J. S. Stevens, Matheson; Suburban Auto & Garage Company, Overland, Marmon, Marion; Toe Water Auto Supply Co., accessories; U. S. Motor Truck Co., truck; Warner Pole & Top Co., tops; Welland-Pope Co., Columbus Electric; Central Brass & Fixture Co. accessories; Craig, Wilson & Craig, automobile wheel.



Central Aisle of Cincinnati Show, with an Aeroplane Overhead and Stoddard-Dayton and Rapid in Foreground



EACH year on Washington's Birthday, the islands of Hawaii have a very extensive celebration, principally to celebrate the good fellowship existing between the islands and the country of which Washington was the father. With success and a most enjoyable time each year, the importance of the celebration has grown and grown, until now it is by far the most important event of the year. So much has it grown that all patriotic Americans within hundreds of miles make it their business to be there and take a part in "the doings." The decorations this year, as shown in the pictures above, were fully up to if not actually superior

to those of any previous year. In the main, the floats in the parade were of a patriotic character, as for instance the American eagle protecting the globe, which was illustrative of the relations between the islanders and the government at Washington. Beautiful women and the magnificent flowers in which the islands abound were very prominent not alone in the floats but throughout the celebration. Prizes were offered for the most beautiful as well as the most grotesque cars and the same in the bicycle class. Similar to last year, the evening saw a very extensive masked ball, lasting into the wee, small hours.

Careful Design Revealed in "N. S. U." Light Car

SIGNIFICANT of the change of heart experienced abroad in respect to light cars is the design of the 5-10-horsepower runabout recently brought out by the Neckarsulmer Fahrradwerke, a German firm whose product goes under the trade name of "N. S. U." Both in its general features and in its carefully worked out details this light car ranks with the highest-priced products of the German industry. The longitudinal section of the unit power plant on the opposite page (reproduced from *Der Motorwagen*), will serve as a sample of the general excellence and also as the illustration of a number of detail points.

As to the general features, the motor has two vertical cylinders 75 by 125 millimeters (2.95 by 4.92 inches), cast in a pair. The cranks are at 180 degrees, which, with vertical cylinders, means that the firing is uneven. It has been demonstrated, however, that engines of this type can be balanced to run as smoothly as could be desired for this service, and the type is a very common one in Europe. The wheelbase is 2.10 meters (about 82 3-4 inches) and the tread 1.15 meters (54 1-4 inches); the tires are 750 by 85, or about 30 by 3 1-2. The same chassis is also built with a four-cylinder block motor 60 by 100 millimeters bore and stroke (2.36 by 3.94 inches), but no drawings of this type are available.

The chassis frame is of pressed steel, both side members being straight, and is 3.035 meters long between the hanger eyes of the semi-elliptic springs. The width of the frame is 0.700 meters. The channel sections of the side bars are 35 millimeters wide and 70 millimeters deep in the middle, and the gauge of the metal is 2.5 millimeters. There are but two cross members, one in the middle and one in the rear; this would hardly be good design for American conditions.

The block power-plant construction has been carried out very thoroughly, including, besides the motor and change-gear, all levers and pedals and the steering column and gear. The base of the plant is built up of a number of parts. The crankcase is divided vertically and transversely between the two cylinders; this seems to be a relic of single-cylinder design and does not allow very easy access to the connecting rod big ends. The front half of the case has two integral supporting arms, which reach to the frame. From the rear half of the crankcase a casting extends around the flywheel and forms the front end of the change-gear housing. This housing itself is unusual; it is cylindrical in shape, being formed of a cylindrical shell with end pieces bolted in. It is hung from the middle cross member by two lugs. The whole is practically a three-point suspension, as the two gear-case lugs are comparatively close together.

One of the neatest details is the method of connecting up the foot-brake. This is at the rear of the gear-case, and of the expanding type. The brake shoes are spread by a cam at the bottom, and this cam is on a shaft which extends under the gear-case and reappears in the clutch well. Here it is provided with a horizontal lever, which is connected by a ball-jointed link with the lever on the brake pedal.

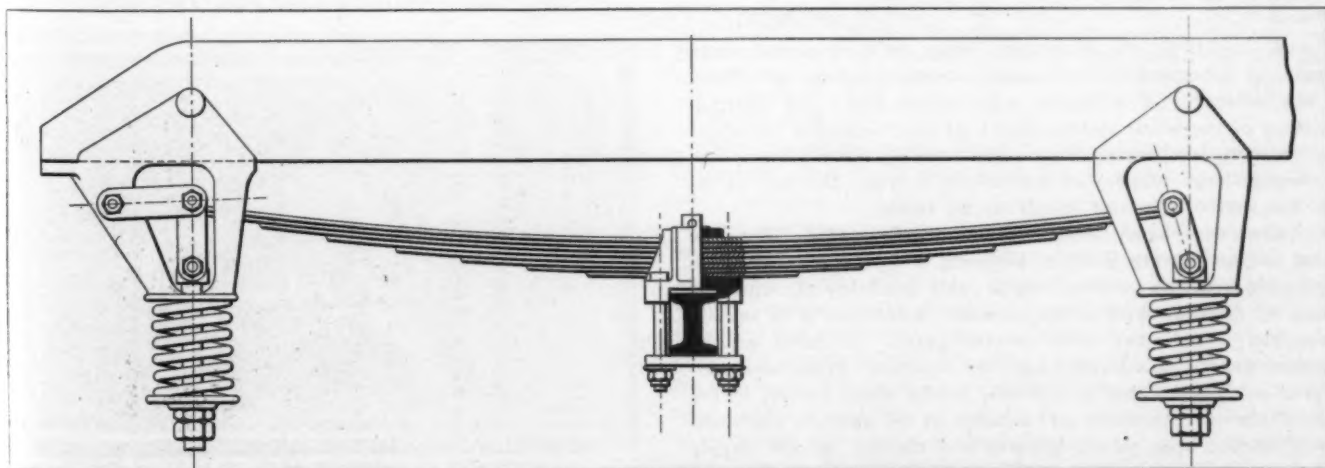
The clutch is a simple leather-faced cone, but differs from the usual design in having its cone stamped from sheet steel, instead of cast of aluminum. This is a cheaper construction and at the same time should give little, if any, increase in weight. At the same time the sheet steel has considerable natural spring, which should be useful in softening the clutch action.

The hand levers for the emergency brake and the change-gear are carried on an extension cast on the gear-case, and entirely independent of the frame. They are of the usual type; the brakes, on the rear hubs, are actuated by a wire cable which passes through the hollow shaft and provides for equalization. The steering column, which is raked at an angle of 45 degrees, is bolted on to the side of the crankcase. The throttle lever and the accelerator pedal are carried on the steering column at the point where it passes through the dash; the lever sets a minimum throttle opening, and the pedal is used to increase this temporarily as desired. The spark advance is fixed and requires no lever; thus the steering wheel is left unencumbered.

The magneto is placed transversely at the front end of the motor, and is driven by worm gears from the camshaft. This results in unusual accessibility.

Spring Suspension of German Truck

The illustration of the spring linkage of the Büssing truck, which appears below, is reproduced from the *Zeitschrift des Mitteleuropäischen Motorwagen-Vereins*, which recently published an instructive article on the steering and suspension of this car. The construction shown is used on the front springs only, for the protection of the motor and radiator, in the case of trucks, but is also used on the rear springs for omnibuses. The drawing is self-explanatory in so far as regards the design and operation. Another feature of the same car is the ball-joint of the steering link. The lever arm is split at its end into a sort of yoke, formed on the inside to receive the ball; when the ball is in place a pinching screw tightens up the yoke to hold it. The drag link has a yoke on its end which straddles the ball and is secured by a taper pin passing through it.



Combination of Semi-Elliptic and Coil Springs Used on the Büssing (German) Heavy Commercial Cars

TWO DIFFERENT KINDS OF MAGNETOS

Editor THE AUTOMOBILE:

[2,191]—Will you kindly answer the following questions in your correspondence column: What are the advantages claimed respectively by makers and users of high and low tension magnetos? As I understand the matter, the low tension magneto requires a coil to transform the low tension current into a high tension current before it reaches the spark plugs, but the high tension magneto does not require any transformer. As simplicity and the elimination of unnecessary parts is the order of the age, why are not all magnetos made for high tension?

I feel that this is a question which will interest a number of your subscribers.

C. W. FLEMING.

Toronto.

As showing just what the users and makers of the low-tension system claim for it, the two following extracts from the catalogs of makers adhering to this type are quoted:

"The 'Four' differs from the 'Six' mainly in that the ignition is by a particularly efficient make-and-break system, with alternating low tension Bosch magneto, geared direct to the motor. Only one main wire is needed to carry the current to all four cylinders. The motor can be started on the magneto by cranking."

And another says: "Our very simple and reliable low tension ignition, being the development and refinement of a type adopted by us in 1905 and used ever since. The simple electrical conditions established by the use of low-tension current exclusively, in combination with the exceedingly simple and effective mechanism, should make the strongest possible appeal to the purchaser who demands an ignition system that will be above all continuously reliable. Magneto is of the low-tension type, gear-driven. The simplest and consequently the most reliable instrument from which electricity can be generated. Because of its exceedingly simple electrical nature no peculiar electrical disturbances are met with, and the workmanship and special materials employed constitute an almost perfect insurance against trouble of any sort. Furthermore, if trouble is experienced, any good electrician can easily locate any trouble and correct it."

On the other side, although there are a greater number of parts used, and although the higher tension of the current passing through the wires makes for increased danger of short circuits, and other troubles, the fact of its well-nigh universal use speaks volumes more than lengthy argument could. Better results at high speed, and more particularly at low speed are claimed for the high-tension system; in fact, it is said that nearly all low-tension magnetos will not start the engine, batteries being relied upon for this purpose.

Thus, the argument sums up to simplicity, either real or apparent, on one side, and real proven reliability on the other.

HOW AND WHY OF STEAM FOR POWER

Editor THE AUTOMOBILE:

[2,192]—I will be pleased to know what are the chief advantages and disadvantages of steam power plants for medium sized automobiles, similar to several well-known machines.

Peoria, Ill.

L. MANSFIELD.

Steam has these disadvantages—many units, meaning large number of opportunities for trouble; necessity for an open flame in the presence of a highly inflammable fuel; low thermal efficiency of the whole system, length of time necessary for starting, necessity for keeping fire on or steam up while the machine is waiting, large number of controlling devices, absolute necessity for source of water supply at all times.

On the other hand, steam has many advantages; thus, the steam engine is very flexible, attaining a low speed, which is impossible with the gasoline engine; this flexibility allowing the maker to dispense with a transmission; moreover, it is readily reversible, doing away with reverse gears. In favor of the steamer, two or more years ago, its noiseless action was considered a big point, but that would hardly stand to-day, in the light of the very noiseless performance of the gasoline machines. To offset the open flame, ignition and electric current supply and timing devices are eliminated.



A HOME-MADE AUTOMOBILE OF MERIT

Editor THE AUTOMOBILE:

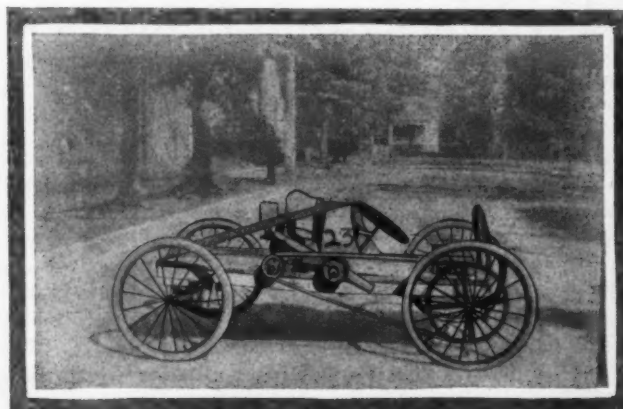
[2,193]—You will find enclosed several pictures of an automobile which I have recently finished, doing all of the work myself. It was in several races and showed quite a little speed, its two-horse-power engine turning the wheels as high as 15 miles per hour. I take your magazine, "The Automobile," and get many ideas from it.

Greenville, O.

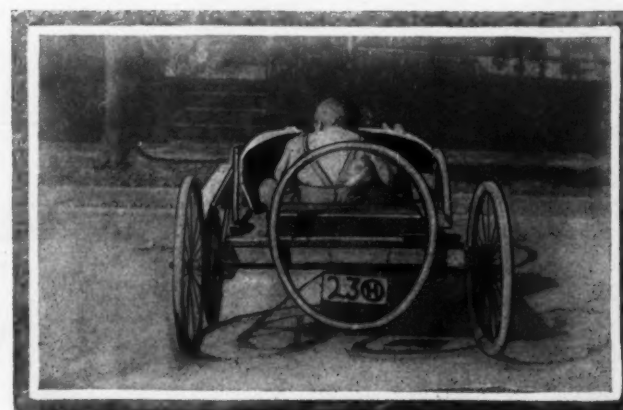
RALPH W. DUNKLE.

The four pictures shown herewith depict Mr. Dunkle's maiden effort as an automobile manufacturer, the pictures being used just as received. The whole construction shows ingenuity, being somewhat different from any type of automobile now on the market. One picture shows the mechanic, from which it is apparent that he is not very old, all of which makes the situation more interesting. There really is no reason why other young Americans should not imitate Mr. Dunkle and build their own automobiles.

The man with mechanical tastes can get much more instruction and pleasure through building a car himself than from using one already made, even though he draws largely on the parts makers for his material. The maker of his own car is never at loss if anything should go wrong on the road, for, knowing every part intimately, he can locate the slightest fault; usually his foresight prevents its occurrence.



Side View of Dunkle's Home-made Automobile



Rear View of the Dunkle Speed Car, Owner Driving

ANSWERED AND DISCUSSED

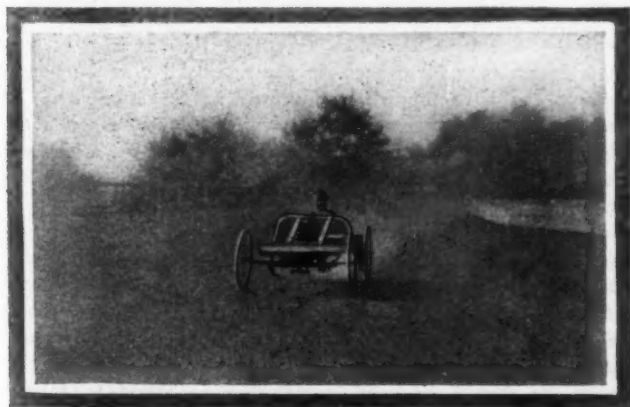
BLACK LACQUER FOR BRASS

Editor THE AUTOMOBILE:

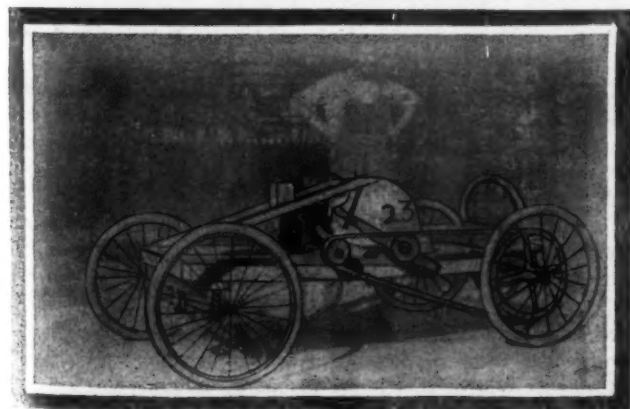
[2,194]—Will you inform me through the columns of "Letters Interesting, Answered and Discussed" where I can obtain a black lacquer suitable for the brass work and lamps of an automobile? I would like something with a gloss black finish that could be easily removed if desired. I have been a subscriber to "The Automobile" for less than a year, but find it very valuable. N. A. GOLD.
Stafford Springs, Conn.

Should one desire to make the lacquer himself, the following formula gives very good results: Dissolve one-half pound of best pale shellac in one gallon cold spirits of wine (so-called). When the shellac is dissolving, agitate it very thoroughly. After mixing, allow it to stand, then filter and bottle. It must be kept from the light as that would make it darker, this being a light lacquer. Now to make a dead black lacquer or finish for similar work, this may be colored black or the following receipt may be mixed instead: Fuse three pounds of Egyptian asphaltum. When liquid, add one-half pound of shellac and one gallon of turpentine.

The latter formula will give the dead black finish now so popular. The quantity of course may be regulated to meet the necessities of the case. For those who are tired of the incessant polishing necessary to keep brass lamps in condition, this lacquer will serve the purpose exactly.



Front View of Home-made Car Doing Fifteen Miles



Final Drive is by Rope, as Shown in Side View

TIRE INFLATION PRESSURE DISCUSSED

Editor THE AUTOMOBILE:

[2,195]—What is the proper tire pressure to use for any given size of tire, that is, what I want to know is, is high pressure dangerous, rubber seems so dangerous a substance? Tire makers give pressures in their catalogs, but not all of them agree, some being lower than others. I would naturally use the lower pressures, but friends of mine say that this is wrong. What shall I do?

Albany, N. Y.

CARL SPIRO.

Other things being equal, the highest safe pressure is the one to be used, and what the latter is, is hard to say, since manufacturers are now urging higher and higher pressures. This they would not do unless their product were strong enough to stand the higher tension. Answering your question, the following advice from the Firestone Tire & Rubber Company is very appropriate:

"It has always been our policy to urge car owners to keep their tires fully inflated; thereby avoiding undue wear and saving their mileage guarantee," said an official of the Firestone Tire and Rubber Company, at the Auto Show.

"Remember that the tire manufacturer cannot make a pneumatic tire that will stand the work and give satisfaction unless the tires are kept inflated to the proper pressure intended for the different sizes of tires.

"Give them air and plenty of it—a pneumatic tire is intended to hold air. Air costs nothing—tires are expensive.

"The tire manufacturer guarantees his product under certain conditions. Meet him on the ground of proper air pressure in your tires and he will meet you on a better basis, if you have tire trouble due to other causes."

As for the variance in the tables of pressures given by the different tire manufacturers, it is probable that each manufacturer gives the pressures which he has found best adapted to his own particular make of tire; so get the table of the maker of your tires and follow that exclusively.

You are quite safe in putting all the pressure in your tires that you can possibly get in with an ordinary hand pump. Power pumps of course should be handled with more care. If you get in too much pressure it will make the tires hard riding and detract from the pleasure of using your car, but the danger of bursting them in this way is so slight as to be negligible.

MELTING OF ALUMINUM ALLOYS

Editor THE AUTOMOBILE:

[2,196]—Can you publish in "Letters Interesting, Answered and Discussed," information regarding the proportions of copper and other metals used in making the aluminum alloy used in transmission cases, motor cases and other automobile work? If possible give the methods used in melting, if it is best to cover the melting metal with a charcoal dust cover, or if other covers are used to this end. I have read somewhere, that the success of good aluminum castings was not obtained till a cover of some sort was used. The modern practice, I think will interest many of your readers. The old text books do not give much information about aluminum alloy. In Kent, it says that more than 11 per cent. aluminum with 89 copper will not make good castings, that they will be hard and brittle. The more modern work shows that this percentage has been very much increased. I will look for this with much interest.

Jerome, Ariz.

CONSTANT READER.

Since one of the prime drawbacks of welding aluminum and aluminum alloys is its rapid oxidation, it would appear as if it were necessary to keep it covered during the melting process for the very same reason. Yet, as a matter of fact, many makers do not do so. In melting manganese bronze, which is much used in the automobile industry, a charcoal cover is a necessity, but this is because of the manganese content, manganese being a powerful and very rapid oxidiser. With white metals, white babbitts, and similar metals, the same advice is good, for the same reason, they all contain some—though little—manganese. In the near future a number of articles on materials of automobile construction will appear in these columns, and it is possible that something on the subject of aluminum may be included.

Discussing the Merits of the Point System

Editor THE AUTOMOBILE:

[2197]—I am much interested in your "Points of Merit in Selecting a Motor" in your issue of March 3, but fail to see how the civil service basis can be followed with enough accuracy by the purchaser of an automobile to enable him to check the motor with any degree of accuracy without elaborate and expensive tests which the ordinary buyer could not undertake. I also cheerfully disagree with your rating on many of the items. Numbering your conditions from 1 to 36, I fail to see how No. 1 could be determined by the purchaser of a motor until the motor had been worn out.

No. 3 lacks definite statements of conditions under which the cooling of the water should take place, unless you mean under the maximum power of the motor, in which case I should increase your points to 25.

In No. 4 thermal efficiency would be very difficult to determine.

In No. 5 it would be very difficult to obtain an absolutely straight line, and if such could be secured I should credit the motor 50 points.

No. 6—I would raise the points for accessibility, east of adjustment, to 50.

No. 7—Too difficult to determine.

No. 9—Perfection in this case should secure twice as many points.

Nos. 12 and 13 are neither quite clear as to where or when you would begin to remove pressure or depression. If you mean from the best practice the credit should be greater. If you mean from a normal exhaust or suction pipe, the points should still be increased.

In 16, 17, 18, 19 and 20 you credit the points for a satisfactory system, etc. This invalidates the points on this whole series, due to the indefiniteness of the word "satisfaction."

No. 24 I would eliminate. It is hardly the fault of the motor if the carburetor does not do its work, and you have already given a credit for proper carburetion.

The points on No. 25 seem entirely too high. A very good motor might require more than a quarter turn to start in zero weather repeatedly. I should cut this down to 25, also 26, for you have already provided for a tight compression.

In No. 28 you make the points for the motor depend on the car which it is to drive, which is not fair to the motor. This also applies to No. 29.

In No. 30 you make a big credit—100 points—for the size of the lubricating oil tank.

No. 31—as most motors have no exterior oil holes to be cared for it seems to me it should be eliminated.

No. 34 is a penalization of the motor for an item for which it is not in any way responsible.

No. 35 is evidently unfair to the large motor: if gasoline consumption is to be considered on the point system it can only apply to motors of a uniform horsepower, which also applies to No. 36.

Certainly this method of determining the value of a motor is very interesting, but I fear the amateur buyer or even the average engineer would be somewhat astonished at the result if he attempted to point up a motor from your basis. READER.

New York City.

In order to facilitate discussion, the suggested system as given in the March 3 issue of THE AUTOMOBILE is here repeated:

Points of Merit in Selecting a Motor

Conditions to be Considered	Points
1. For each year of service rendered.....	5
2. For a tight compression without an oil seal.....	10
3. For each 10 degrees reduction of the temperature of the cooling water below 212 degrees F. (to 170 degrees F.)....	10
4. For each one per cent. increase in thermal efficiency.....	10
5. For a straight line torque performance up to 1,000 feet per minute of piston travel.....	20
6. For accessibility, ease of adjustment, etc.....	20
7. For each reduction of 1,000 pounds per square inch of extreme fiber strain due to secondary moments at 1,000 feet per minute of piston travel, measuring the strain at any point desired on the section of the crankshaft.....	20
8. For tight cylinders under a hydrostatic test of 500 pounds per square inch.....	20
9. For perfectly round and parallel cylinder bores.....	10
10. For noiseless performance.....	25
11. For absence of packed joints.....	10
12. Per pound per square inch of back pressure removed.....	20
13. Per pound of suction depression removed.....	30

14. For a securely fastened flywheel.....	20
15. For integral or equally secure cams.....	20
16. For a satisfactory wipspark system of ignition.....	20
17. For a satisfactory system of high-tension magneto.....	20
18. For a satisfactory dual ignition system of ignition including a magneto.....	30
19. For a satisfactory double system of ignition, including magneto and a multi-coll.....	30
20. For a satisfactory double system of ignition with a magneto and a uni-sparker.....	30
21. For an ignition system in which the wiring is run in a proper conduit system.....	20
22. For a carburetor which will deliver gas of uniform density at all speeds of the motor.....	30
23. For a motor which can be assembled and taken down without having to use a special wrench or tool.....	30
24. For a motor which will not pop back in the carburetor under any condition of mixture.....	10
25. For a motor which will start on a quarter turn of the crank in zero weather repeatedly.....	100
26. For a motor which will start on the spark repeatedly after it is shut down for a period of 10 hours.....	100
27. For general appearance and exterior finish.....	20
28. Considering a given gear ratio; for a motor which will accelerate the car it is placed to drive, from a standstill to maximum speed in the shortest time.....	30
29. Considering a given gear ratio; for a motor which will drive the car it is placed to drive, up a ten per cent. grade, on "direct" at 1-4 (or better) of the best speed of the same car on a level.....	100
30. For a motor which is positively lubricated and capable of running 10 hours without having to be attended to (no addition of lubricating oil).....	100
31. For a motor without any exterior oilholes to be cared for..	40
32. For a motor which will not leak lubricating oil.....	10
33. For a motor which will not smoke.....	10
34. For an installation which is tight enough to exclude dust (a satisfactory system of pans).....	100
35. For a motor which will deliver the power required on a gasoline consumption of one gallon for each ten miles....	10
36. For each additional mile per gallon.....	10

No. 1—Should be taken to represent the number of years that a design may have been on the market. It is intended to represent the advantages which accrue from experience. The number of points given were limited, for the reason that a motor is not necessarily bad because it is new. At the same time, from the purchaser's point of view, he is bound to recognize the presence as induced by experience as against the risk which is taken in the purchase of any new device.

No. 3—Involves taking the temperature of the cooling water under the conditions as follows: (a) when the motor is running on a retarded spark with the car standing still; (b) after the car ascends a long, fairly severe grade; (c) under general running conditions. Obviously the water will boil if the temperature reaches 212 deg. Fahr., and incrustation is bound to form to the disadvantage of the system. It is even possible that a certain amount of incrustation will accumulate at temperatures above 170 deg. Fahr.; hence, the desirability of giving 10 points in favor of the motor for each 10 degrees below 212 degrees, and limiting the reduction to 170 deg. Fahr.

No. 4—As the correspondent states, it would be extremely difficult to establish by a purchaser, but it is indirectly possible to reflect thermal efficiency by noting gasoline consumption. The thermal efficiency is inversely proportional to the gasoline used.

No. 5—Presents an extremely important condition, and it may be that the chart line, when plotted, will be straight within the limit stated for very few motors. Such motors exist, however, and purchasers can well afford to examine into the characteristics of the motors they propose to purchase, with a view to ascertaining their performance with increasing speed. The performance will be best if the torque holds out.

No. 6—Certainly does represent an extremely important condition, especially to the motorist who confesses no skill as a

mechanician. It would be interesting to hear from many motorists in relation to accessibility and ease of adjustment. The columns of THE AUTOMOBILE will be placed at their disposal.

No. 7—May be difficult to determine by any process which an unskilled motorist could bring to bear, but a reasonable retainer to an engineer of some competence will bring the information with sufficient certainty to make it worth while.

No. 9—Which refers to round and parallel cylinder boring, is of less importance at the present time than ever before, since the cylinders in nearly every automobile are ground, which process brings accuracy within allowable limits of tolerance. Even a variation of several thousandths of an inch, however, would not interfere with the working of a motor if the piston rings are properly placed.

Nos. 12 and 13—Represent a condition which is very serious, but any autoist can tell if the power of his motor increases enormously when the muffler cut-out is open; such an increase is direct evidence of back pressure; he would still be without a basis of comparison, but he would have his mind drawn in the direction which will result in advantage to him, even though he might not be able to put his conclusions into definite figures. No. 13 represents even greater trouble, but a motor which stalls with apparent ease may be suffering from the ills of excess depression.

Nos. 16, 17, 18, 19 and 20—Being based on satisfaction, represents nothing very definite, as the correspondent states. At the same time, the fact that ignition is included in the system is a warning to the prospective purchaser that he has something to investigate, and if he does not know from his own experience what constitutes satisfaction, from the ignition point of view, he might consult someone who does. At all events, this is a matter which will stand discussion.

No. 24—The carbureter is not at fault for popping back; the trouble comes from having a poorly designed intake manifold. Popping back will not transpire if the rate of travel of the gas in the manifold is greater than the rate of flame travel within the molecular structure of the gas.

Nos. 25 and 26—We would like to hear from other motorists in relation to these points.

Nos. 28 and 29—The point system as originally devised was intended to refer to a motor as it relates to an automobile. The method of utilizing the power under the circumstances must be taken into account. If the gear ratio is not in accord with the power of the motor, considering the car construction and weight, the motor may be capable of propelling the car on a hard, level road, but it may not do good work on grades.

No. 30—It does look like offering a premium for a decent-sized oil tank, but the importance of proper lubrication is sufficient to demand a relatively large tank, and the means by which the lubricant will be fed to the points to be lubricated with precision and certainty. Flooding a bearing may keep it in good order as long as the oil holds out, but if the flooding method is employed the tank must be big enough to supply the requisite quantity of oil for a reasonable length of time—10 hours would scarcely be too long.

No. 31—If, as the correspondent states, motors are not hampered with exterior oil holes, then it will not be necessary to give this matter consideration. It will be just as well, however, to glance over the power plant during selection, and make sure that provision for oiling is complete, in the absence of these exterior methods of feeding oil.

No. 34—It is not believed that dust pans would be used at all were it not for the presence of motors. One of the duties of the dust pan is that of compelling air to enter through the radiator; this is when the fan is in the flywheel. Even with the best possible construction, it is customary to allow for a leakage through the dust pan of one-third of all the air which the flywheel fan can handle.

No. 35—The fuel consumption may be measured on a basis of ton-miles, which is the custom in economy runs; but the practice of overloading the automobiles during these runs induced a false economy, which is rarely ever equalled under normal conditions on the road, considering an autoist of average skill. It also seems to be true that automobiles take about a certain amount of gasoline almost without regard to the types of motors employed. There are exceptions, of course; but the fact remains that 10 miles per gallon, considering an ordinary touring car, is a fairly common figure, and 12 to 14 miles per gallon is reached when the cars are in rather good shape, and handled under average conditions. This matter is open for discussion.

The Editor does not believe that this point system of selecting automobiles can be reduced to a level of good practice without being refined, and refinement will come as the result of discussion. The experiences of autoists should be of excellent value in this connection, and it is hoped that they will come forward and give intending purchasers the benefit of their experience.

If the motor can be examined in this way by an intending purchaser, then the same principle may be applied to the whole automobile, and even if the point system fails to satisfy the whole situation, it will at least compel intending purchasers to examine the cars in which they take an interest, with much more care than they might otherwise be induced to do.

Coming Events in the Motoring World

Mar. 15-19.....Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.
 Mar. 15-19.....Bridgeport, Conn., Automobile and Aeronautic Show, Bridgeport Automobile Dealers' Assn.
 Mar. 17-19.....Louisville, Ky., Automobile Show, Louisville Automobile Dealers' Association, in the Louisville Armory. Hubert Levy, Secretary.
 Mar. 21-30.....Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsmen's Show, Buffalo, Launch Club. D. H. Lewis, Mgr., 760 Main St.
 Mar. 21-28.....Denver, Col., Convention Hall, Denver Motor Club's Annual Automobile Show.
 Mar. 26-Apr. 2...Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.
 Mar. 26-Apr. 2...Montreal Automobile and Motor Boat Show, Official Motor and Sportsmen's Show Committee of the Automobile and Aero Club of Canada, in the Coliseum. E. M. Wilcox, Manager, 123 Bay St., Toronto.
 Apr. 11-16.....Elmira, N. Y., State Armory, Automobile Show, Elmira Chamber of Commerce.
 Apr. 23-29.....Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
 Jan. 17-24, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
 Feb. 13-25, 1911...Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

Mar. 19.....Altadena, Cal., Hill Climb, Licensed Motor Car Dealers' Association, Los Angeles, Cal.
 Mar. 20.....Hill Climb, San Francisco Motor Club, San Francisco, Cal.
 Mar. 22-25.....Daytona, Fla., Speed Carnival, Florida East Coast Automobile Association.
 Mar. 28-29.....Savannah, Ga., Endurance Run to Jacksonville, Fla., Savannah Automobile Club.
 Apr. 8-10 & 13-17...Los Angeles, Cal., Inaugural Meet, Motordrome.
 Apr. 30-May 2...Philadelphia, Roadability Run to Atlantic City, Quaker City Motor Club.
 May 2.....Flag to Flag Endurance Contest, Denver, Col., to City of Mexico.
 June 11.....Wilkesbarre, Pa., Annual Hill Climb Up Giants' Despair, Wilkesbarre Automobile Club.

THE AUTOMOBILE

Vol. XXII

Thursday, March 17, 1910

No. 11

THE CLASS JOURNAL COMPANY

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Other Countries in Postal Union, including Canada - - - - - One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft,
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FOREIGN SUBSCRIPTION AGENTS

ENGLAND:—W. H. Smith & Sons, Ltd., 136 Strand, London, W. C., and all book-stalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.

FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armée, Paris.

GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.

The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

Fire-fighting has advanced in many ways and there is ample reason for believing that the situation is well in hand from almost every point of view. Automobile methods are slowly but surely creeping in, and from now on it is scarcely to be believed that municipalities will indulge in the purchase of any more of the obsolete equipment which is likely to be offered. This field, now that it is awakened, will prove as a boon to makers of automobiles; it will give them an outlet for their surplus energy, and, in the event of overproduction in the pleasure vehicle line, it will serve, to some extent, as a safety valve for the industry. The conservatism of some of the municipal authorities as it is reflected in the relation of the purchasing representatives to the class of equipment selected, is now more favorable to the automobile side of the situation, and the actual merit of this class of equipment, of which there is not the shadow of a doubt, will soon bring to bear the potential weight of utility of a high order. That insurance exchanges will take to the automobile is easily reflected from the fact that fires will cease to so heavily draw money from their coffers, and it is the saving of money that counts for them.



Lubrication has its many angles; it is not limited to the mere process of floating bearings, nor is it usually given credit for all the good that it is employed to accomplish. Friction is represented by the energy dissipated in a bearing, and the total loss is lessened if the coefficient of

friction is lowered. It is the function of lubricating oil to offer a low coefficient of friction and to shear in its section rather than to wipe off of the bearing surfaces. The energy which should be transformed into heat under working conditions, according to this theory, is that represented by the parting of the molecular structure of the lubricant rather than the rubbing of metal to metal which would transpire were the parts to contact, as they would in the absence of the lubricating oil.

It is the duty of lubricating oil, in addition to maintaining a condition of fluid friction, to seal up the journals and keep the silt of the road from penetrating and adding its abrading qualities to complicate the situation. Besides accomplishing these important duties, the oil acts as a "bumper" and it is quite as effective in this regard as a bumper on a freight car, or a shock absorber on an automobile. The life of an automobile, according to this way of reasoning, may be prolonged by the proper use of lubricating oil.



Cylinder lubrication is much misunderstood in all probability, and frequently, when carbon formations are charged to lubricating oil, they are due to excesses of gasoline which is partially burned in the presence of less than the proportional amount of atmospheric air to deliver to the requisite quantity of oxygen. If cylinder oil does lie at the bottom of the trouble, to the exclusion of carbon from gasoline, then there is an explanation wanting. Is it due to the difference between the flash point of the oil and the heat required to inflame the carbon in the oil, that carbon is formed? If so, the answer must be found in one of two ways, i.e., eliminate the carbon, or, elevate the flash point of the oil.



The point system, as originally suggested in THE AUTOMOBILE, for use in the selection of cars by relatively inexperienced autoists, is probably in need of much discussion, rather with the hope, perhaps, that it will ultimately be sufficiently refined to serve the intended purpose. With hundreds of automobiles to select from, the man who goes after his first car is confronted with a serious problem, which to him is all the more momentous if the size of his purse is in sparse conformity with the dimensions of his aspirations. It is a serious matter to make a mistake under such conditions, but it is annoying to a man of means to find himself in full possession of that which does not live up to his expectations.

In any event, even assuming that a system of examination cannot be perfected sufficiently to serve every end, it will nevertheless afford sufficient advantage to warrant its use on the ground that it will compel the purchaser to do two things, i. e. (a) consider his own requirement at some length, (b) ascertain by personal examination something of the makeup of the automobiles which would seem to conform to his expectations. In nine cases out of ten, men who have trouble with the cars they select are at fault in the main, because they have one idea in their head, and purchase another through the influence of their pocketbook. Disappointment is their sure, if not just, reward. They cannot by any manner of reasoning attach blame to the maker of the automobile so selected, and it is believed that the point system would help them to unify their thoughts with their actions.

BOSTON DEALERS FORM A LICENSED ASSOCIATION

NEW YORK DEALERS' ASSOCIATION TAKES ROOT--SIXTY MAKERS REPRESENTED AT PRELIMINARY BOSTON MEETING--EVERY MEMBER MUST REPRESENT AN A. L. A. M. MAKER

ONE of the interesting angles of the late Boston Show was represented in the coming together of the Boston agents for automobiles manufactured under the Selden Patent license. This idea which was first put into force by the New York dealers was enthusiastically taken up by the agents in Boston of sixty Selden makers. The new organization is being incorporated under the laws of Massachusetts, and will have for its main purpose the furthering of the Selden Patent interests as they relate to Boston agents for automobiles.

At the preliminary meeting the little formalities were disposed of most readily, because of the experience which was gained through the efforts of the New York dealers to organize, and the officers of the new Boston Association were slated as follows: President, John H. MacAlman, Columbia and Stearns; vice-president, J. S. Hathaway, White; treasurer, F. A. Hinchcliff, Winton; Secretary, Chester I. Campbell.

The directors include the above-named officers, and J. W. McGuire, of J. W. McGuire & Company, Pierce-Arrow; J. W. Bowman, of J. W. Bowman Company, Stevens-Duryea and Everitt; E. E. Wing, Marmon; S. P. Underhill, of the Underhill Company, Knox; C. F. Whitney, Park Square Auto Station, Alco and Stoddard-Dayton; E. D. Gilmore, Whitten & Gilmore Company, Chalmers and Hudson.

The Boston situation is such that about 40 dealers handle all of the licensed automobiles there represented. To show how completely the idea of association takes among them, it is only necessary to mention that 36 came in during the first meeting.

While it is not positively asserted that next year's show will be confined to licensed automobiles, it is quite generally understood that Manager Campbell will have charge of the show, in which event it is quite evident that his efforts will be confined to the character of automobiles that support a license tag.

A. L. A. M. LEGAL TECHNICALITIES UNTANGLED

DELAYED action of the A. L. A. M. has been due to some legal entanglements, due to the changing of the name of the Electric Vehicle Company to the Columbia Motor Car Company. Counsel for the A. L. A. M., Betts, Sheffield, Bentley & Betts, have advised their client (the A. L. A. M.) that they have secured from Judge Hough an order to show cause why the petition should not be granted and the supplemental bill filed in the matter of the Ford suit and the suit against Panhard & Levassor and Neubauers.

The order to show cause is returnable April 1, and defendants must serve complainant's counsel with answering papers on or

before March 28. The order also provides that they must show cause why their time for pleading should not be limited to April 11, and why the time for taking the testimony should not be limited, apportioned, and the scope of the testimony limited to the transfer of the interest involved.

It has been claimed by many who profess to be on the inside, that the A. L. A. M. is holding back any action it might contemplate in its fight against independents until this legal formality is completed, and in view of the near settlement of this matter, it looks as if the outsiders will soon be in a position to learn of the real attitude of the licensed makers of automobiles.

FLANDERS DENIES RUMOR OF MERGER

When J. P. Morgan & Company purchased the E-M-F Company and paid \$4,800,000 for the outstanding stock (not counting the stock which is held by the Studebakers and Frederick S. Fish, amounting to 30,817 shares in the aggregate), there was talk of a big merger and the situation looked threatening. It was stated at the time, in *THE AUTOMOBILE*, that there had been a transfer and that \$5,000,000 was involved, but that the particulars were not to be had.

That the market has heard the last of the story is scarcely to be taken for granted but the time is not ripe for a big merger. Just now the papers are excited about the profits which were taken by the former owners of the E-M-F control and it is claimed that the plant, at Detroit, will be enlarged and that the new board of directors voted \$100,000 for the purpose.

The real situation is that the fight of the Studebakers with the E-M-F has been disposed of by the purchase.

THREE MORE SELDEN PATENT LICENSEES

According to an announcement of the Association of Licensed Automobile Manufacturers made public Tuesday, three more companies have been licensed to manufacture automobiles under the Selden patent. They are the Speedwell Motor Car Company, of Dayton, O., which makes the Speedwell; the Courier Motor Car Company, also of Dayton, making the Courier, and the Ohio Motor Car Company, of Cincinnati, making the Ohio.

CLEVELAND MAY HAVE LICENSED DEALERS

Hardly had the Cleveland show season come to a close with the winding up of the Cleveland Automobile Club's exhibit, which was the second of the year, when the dealers started to discuss the show prospects for next year.

Until there is a larger place available than Central armory, two shows will be absolutely necessary. There is some talk of following the New York plan and having one for pleasure cars and another for the commercial vehicles.

Then again there is a plan on foot for the organizing of the dealers in licensed machines. If this organization is perfected, the shows in Cleveland next year will be held separately by the licensed and unlicensed dealers. The latter also promise to organize if the former do.

BRADLEY JOINS U. S. MOTOR COMPANY

L. M. Bradley, who for the past three years has been advertising manager of the American Motor Car Manufacturers' Association, and assistant to former General Manager Alfred Reeves until the latter accepted the general management of the Association of Licensed Automobile Manufacturers, has joined the United States Motor Company, the recently organized \$16,000,000 corporation which has already absorbed the Maxwell-Briscoe Motor Company and the Columbia Motor Car Company. He will act as director of advertising and publicity. In his new position Mr. Bradley will direct an extensive campaign.

MAXWELL-BRISCOE DELVING DEEP IN REAL ESTATE

AS a further evidence of activity involving the Maxwell-Briscoe interests, attention is called to current reports referring to the transfer of the property known as the Tichenor-Grand Sales Stables and Riding Academy, on Sixty-second street just west of Central Park West. The property comprises a seven-story brick and stone building, with a frontage of 75 feet at 3-7 West Sixty-first street, with a depth of 210 feet, which runs through to Sixty-second street. It is claimed

that this property is worth \$600,000 in round numbers, and while it is reported that the Maxwell-Briscoe Company will occupy a considerable portion of the building after it is fitted out, it is said that other companies will be afforded accommodation within the same building. The Maxwell-Briscoe Company has a large building at the northeast corner of Broadway and Sixty-fourth street, and a further acquisition on this enormous scale is at the bottom of rumors of further efforts in the merger line.

STUDEBAKER DENIES INDIANAPOLIS RUMORS

It is understood by those who are familiar with the automobile situation that some interest is offering inducements to certain of the makers of automobiles in Indianapolis, the character of which would seem to indicate that there is a definite and well organized attempt on the part of some cluster of automobile making investors to bring about a merger on a large scale. William R. Innis, president of the Studebaker Brothers Company of New York, and a member of the board of directors of the company of the same name, with its plant at South Bend, Ind., goes to some pains to deny that the Studebaker interests are in this move. Naturally, the Studebaker Company would be regarded as likely to be in a move of this character, in view of the acquisition of the E-M-F plant by J. P. Morgan & Company for the Studebaker account; it is a habit the public has of interpreting the law of probabilities, basing their prognostications upon the efforts in the past. Therefore the automobiling public watches these concerns for new developments.

S.A.E. SUMMER MEETING WILL BE AT DETROIT

Discussion in relation to the doings of the Society of Automobile Engineers leads to the conclusion that the Summer meeting will be held in Detroit, with dates which will overlap the Grand Rapids Road Race, which has been sanctioned by the A. A. A., with precise dates to be filled in, with the understanding, however, that the middle of July is a good approximation. The society is now assuming active proportions, and President H. E. Coffin is handling the matter with a vigorousness which promises extra results in all directions. The Summer meeting is always one of the greatest importance to the society, and Detroit seems to be the most favored place for this year. Certainly Detroit offers an unusual number of attractions, among which it is almost unnecessary to mention the great aggregate of plants which are within trolley car reach of the center of the city, and it is fortunate that automobile makers there offer every facility and keep open shop for society members. The exact date of the meeting is yet to be fixed.

MORGAN MERGER RUMORS UNCONFIRMED

Despite the persistence with which rumormongers continue to discuss the possibility of a combination under the skillful guidance of J. P. Morgan & Company, involving Maxwell-Briscoe, United States Motor Company, General Motors Company and Studebaker, which rumors are bolstered up by statements emanating from Indianapolis and elsewhere to the effect that they have had opportunities to participate, it is impossible to discover any authentic source of information which would lead to the conclusion that any such matters are beyond the realm of speculation. In the meantime it is inexpedient to disregard the existence of activity by way of real estate purchases and other problems of moment which here and there float to the top and indicate to the observer of acumen the rumblings of a substantial volcano which are likely to lead to something more definite in the near course of events.

LOS ANGELES RACES WERE OPEN TO ALL

LOS ANGELES, CAL., Mar. 12—After being threatened with the recall of the sanction granted by the A. A. A., the Los Angeles Motor Racing Association, which is controlled by the licensed dealers' association, withdrew its decision to restrict the races at Ascot Park to licensed cars. Several entries were cancelled by the disgruntled licensed dealers, but the racing nevertheless was spirited and interesting.

One record was broken, Livingstone on a Corbin reducing Burman's 50-mile mark to 50:26 1-5, in a race in which he defeated Harroun and Matson on Marmons, Free on a Ford, Odell on a Pennsylvania, Edecott on a Cole and Seibel on a Sterling. Livingstone drove the first 20 miles in 20 flat. Harroun won two five-mile races and one ten-mile.

OFFICIAL SANCTIONS GRANTED BY A. A. A.

Sanction No.	Date of Event.	Kind of Event.	Promoter.
131.	March 22, 23, 24...	Beach races.	Fla. East Coast Auto Ass., Daytona, Fla.
132.	April 8, 9, 10.....	Track.	Los Angeles Motordrome.
133.	April 13.....	Track.	Los Angeles Motordrome.
134.	April 15, 16, 17...	Track.	Los Angeles Motordrome.
135.	March 12 to 16....	Match race and speed trials.	Fla. East Coast Auto Ass., Daytona, Fla.
136.	May 5, 6, 7.....	Track.	Atlanta Auto. Assn.
137.	March 20.....	Hill climb.	San Francisco Motor Club.
138.	March 26.....	Hill climb.	Atlanta Journal & Fulton Co. Automobile Club.
139.	April 30, May 1, 2..	Roadability run.	Quaker City Motor Club.

BUYERS OF VELIE'S WILL BE PROTECTED

The Velie Motor Vehicle Company has notified its selling agencies, as well as the owners of Velie cars, that all its product will henceforth be guaranteed not only against defects in material and workmanship, but also against all damages arising from patent litigation. The form includes the following clause: "We further agree to indemnify the purchaser of this car against loss through patent litigation arising in connection with the purchase of this machine by reason of alleged patent infringement." The Velie company further states that its full financial strength is behind this guarantee, and that any attempt to antagonize dealers in or owners of Velie cars will be met with prompt and decisive action.

CRESCENT ATHLETIC CLUB HAS AMBITION

The Crescent Athletic Club's challenge for an automobile team reliability contest of ten or twelve cars on a side, to be held over Long Island roads on some date in the Spring for the trophy offered by A. R. Pardington, has been accepted by the Long Island Automobile Club at a special meeting of their contest committee. That committee and the automobile committee of the Crescent will meet this week to take up and thoroughly discuss the matter.

FOUR NEW COMPANIES AND MUCH BUILDING IN DETROIT

DETROIT, March 14—The latest recruit to the long list of makers in the automobile manufacturing field is the T. H. T. Motor Co., which, capitalized at \$100,000, plans to manufacture a four-cylinder touring car on designs of a sample which is listed as one of the assets of the company. Announcements of factory space and operating staff are expected shortly.

The Carhartt Company is another recent addition to Detroit's string of automobile manufacturers, having just filed articles of incorporation, with a capital stock of \$500,000, of which \$300,000 is common and the remainder preferred. Hamilton Carhartt, Sr., famous as a manufacturer of clothing, is president of the company, and Hamilton Carhartt, Jr., will act as vice-president. Ralph C. Lewis will have charge of the mechanical department, and will also be secretary. A factory has been secured at 1524 Jefferson avenue, and deliveries of the car, which will sell at \$2,250, will begin in August.

The Sibley Motor Company, capitalized at \$80,000, has been incorporated at Detroit. A four-cylinder 20-horsepower roadster, to sell at \$850, will be produced. An experimental car has been in use for nearly a year with good results, and it is the intention to secure a factory at once and begin manufacturing this season.

The Cass Motor Truck Company has been incorporated with a capital stock of \$300,000 to manufacture automobile trucks. W. Ferguson is the principal stockholder of the new concern.

Much building is now going on, and nearly all of it of a

permanent character. The Cadillac factory is so cramped for quarters that the body-finishing department has been moved several blocks to the Detroit riding academy, which has been transformed into a finishing plant. Some construction work already is in progress on the site of the firm's new factory, and several of the carbarns which occupy the property recently purchased, adjacent to the plant, are in use, pending the time when they can be replaced with the factory's new buildings.

The Chalmers company broke ground Monday for a new building, 150 by 50 feet, of one-story construction, to be used for the block-testing of motors and the heat-treating of steels. The building will be of cement and steel exclusively, not one bit of inflammable material being employed in its construction.

The new factory of the Hudson company, located almost directly across Jefferson avenue from the Chalmers, is progressing rapidly, the walls being already up. The Watt Motor Car Co., which has been occupying temporary quarters on Porter street on the west side, has purchased a plot of property in Hamtramck and plans to have a factory built in the early Spring to enable it to complete its manufacturing schedule, which calls for 600 of the 1910 models. The Van Dyke company has bought the Lowrie Lumber Company property, at Junction and Leavitt, and has broken ground for a factory. The Owen Motor Car Company is now installed in its factory on East Boulevard, near the Packard plant, and is hard at it, working on the 500 high-power cars which will be manufactured this year.

REEVES DIFFERS WITH KNIGHT'S ATTORNEY

IN THE AUTOMOBILE issue of February 17 Charles Y. Knight, through his attorney, discussed the merit of the Reeves Re-Issue Patent No. 12,991, which the Packard Motor Car Company has a license to use, and according to the Knight version of this re-issue, it is of little value because in the process of obtaining a re-issue the claims were enlarged and the scope of the patent was so altered that as a re-issue it is in conflict with court rulings bearing upon this subject.

It is now claimed by the owners of the Reeves Re-issue Patent, that Dugald Clerk in his discussion of the situation failed to consider all the facts and reached erroneous conclusions in consequence. The Reeves representatives go on to say that it is true of the re-issue that it shows several different arrangements of valves for compressors, motors, etc., including steam engines, and an examination of the re-issue will of course show that it differs in material respects from the preamble and claims as originally included. The Reeves interests are authority for the statement that it is entirely practicable to employ the essential elements of the valve structure, shown and claimed by the patent, in a gas engine. The Knight attorneys, on the other hand, base their contentions upon the rulings of courts, some of which were given in THE AUTOMOBILE, and they stoutly maintain that the Reeves Re-issue is not in conformity with these rulings. It is anticipated that opportunity will be afforded the lawyers on both sides of this situation to exercise their talents and acumen.

KEEN INTEREST IN ELMIRA'S SHOW

ELMIRA, N. Y., Mar. 15—The Elmira Chamber of Commerce is to conduct an Automobile Show between April 11-16, inclusive, in the New York State armory. All of the local dealers and those agencies that cover the Elmira territory are manifesting a keen interest in the show and the present indications are that we will have a very fine exhibition.

Handsome electrical and other kinds of decorations will be indulged in and band concerts will be held afternoons and evenings. There will be interesting displays in the nature of aeroplanes.

OLDFIELD ADVERTISES UNOFFICIAL RECORD

Barney Oldfield's publication of an unofficial record made by his Benz car on Ormond Beach has drawn a sharp rebuke from S. M. Butler, chairman of the A. A. A. contest board. The report was that on Sunday last the Benz, with Barney at the wheel, covered a mile faster than the world's record. When this was made public Chairman Butler immediately wired Oldfield that no so-called records must be published unless made with due timing supervision and sanction. This point is expressly covered by the rules of the A. A. A. Chairman Butler also withdrew the sanction granted for the Oldfield-De Palma match, which has been called off, and no official trials can be held on Ormond Beach until the meet of the Florida East Coast Automobile Association, March 22 to 25.

CROXTON-KEETON PLANS BIG INCREASE

MASSILLON, O., March 7—The Croxton-Keeton Motor Company is planning to increase its capital stock from \$300,000 to \$750,000, of which two-thirds is to be common and one-third preferred 7 per cent cumulative. A committee appointed by the local board of trade to investigate the standing of the company has made a favorable report, and the board will now stand back of the plan. It is believed that the additional capital can be secured in Massillon without the least difficulty.

The company now employs 200 men, and its entire product for 1910, estimated at 600 cars, has been sold. If the present plans are put through the capacity will be doubled. It will be the policy of the management henceforth to specialize to a considerable extent on commercial cars, especially taxicabs.

REGISTRATION OF RACING OWNERS

The following drivers have registered with the Contest Board: Registry: 1. George H. Robertson. 2. Ralph De Palma. 3. Frank L. Lescault. 4. David L. Bruce-Brown. 5. Ralph K. Mulford. 6. Louis A. Disbrow. 7. Edwin H. Parker. 8. Willie Haupt. 10. William Knipper. 14. Harry H. Cobe. 15. Jack Lavin. Amateur Driver: 1a. Caleb S. Bragg.

FLAG TO FLAG CONTEST IS RAPIDLY ASSUMING FORM

MANY of the manufacturers are looking toward the Flag to Flag contest which is to start from Denver on May 2 to the City of Mexico, a distance of 2,400 miles, which will be covered in 21 days, approximately 114 miles per day with 8 hours running time. The contest will be run under the sanction and rules of the A. A. A. Several handsome trophies will be given, the principal one by G. A. Wahlgreen, of Denver, who is manager of the race. G. A. Blanchard, of Denver, assistant manager, is in the East now calling on the factories explaining and securing entries. This run involves many novel features, and being in an entirely different country from any event yet promoted, should be of keen interest to the factories who are looking for territory in which to sell their cars.

Westerners are more universally wealthy than the Easterners, and have adopted the automobile more as a necessity than a luxury. Ranchmen who have thousands of acres to oversee can save many hours of their time, and can be in closer touch with their lands and conditions than by the old mode of riding horseback. The natural roads are generally very good; of course in the country there are many bad places, but it is understood that the trail of this tour is not hazardous, considering the long distance. The Business Men's Associations and Chambers of Commerce in all the cities that the tour goes through are making preparation for the entertainment of the tourists upon their arrival. The president of Mexico is taking a personal and keen interest in the event. Probably no body of automobile men will be more royally received and entertained than those who accompany this tour when they arrive in the City of Mexico.

In the City of Mexico there are probably 8,000 automobiles, 75 per cent of which are of foreign make. This seems very strange owing to the prominence of the American manufacturers, and this republic being a sister country. It is probably due to the fact that American manufacturers so far have found an outlet for their products in America, without being compelled to seek this new outlet. However, this condition will not always prevail in

America, and it will not be long before they will look upon this country with indifference.

Everything is being looked after for the convenience of the tourists through the barren country. A Pullman train with dining car service will be made up at Denver and will accompany the tourists the entire route, stopping at each control at night, where the drivers and representatives from factories will be able to sleep and eat with all the comforts of home.

The management is trying to secure a special rate from the City of Mexico to New York for shipment of the cars in bulk so that they can hold a parade in New York. An automobile show in the City of Mexico is being arranged for the week following the arrival of the cars in that city where all the contesting cars will be exhibited free. If the show proposition does not go through they will have the "bull ring" in which to exhibit.

Needless to say, the car that makes this tour successfully and with a perfect score will prove to the manufacturers and the people that it is a mechanical masterpiece. The expense of the tour is not as great as one would imagine on a careless thought. It is estimated that \$1,500 to \$2,000 will take a car with two men from its factory through the tour and return, and considering the eagerness and interest which is displayed in the section of country which the tour will go through this expense will make a very profitable investment.

Manager Wahlgreen and his assistant Mr. Blanchard are well known to the automobile industry, and they have been connected with the automobile shows and races in Denver for the past eight years. There is no doubt but that they will look after all convenience and details for this contest to the satisfaction of the contestants.

The entries for this event will close April 15, the Premier entry being No. 1. A conservative figure of the cars which are expected to start is from 35 to 40. Many manufacturers are awaiting an interview with Mr. Blanchard before making their entries.

AUTOMOBILE ASSOCIATION ORGANIZED TO DEFEND MEMBERS

A NEW automobile association, unincorporated, has been formed in the State of New York for the purpose of furnishing attorneys to defend its members in New York and throughout the United States. This association has been organized by representative automobilists and has made application for membership in the New York State Automobile Association. A work similar to that to be carried on by this association, has been performed by the Automobile Legal Association of the New England States, which has its headquarters in Boston, Massachusetts. The New York Association which is known as the Automobile Legal Association of New York is a separate and distinct organization, and is not, as has been mistakenly stated, a branch of the New England Association.

The officers of the Automobile Legal Association of New York are: H. Walter Webb, president; Frederick H. Elliott, secretary, also secretary of the American Automobile Association, and William A. Thibodeau, general counsel and treasurer.

The organization possesses an Advisory Board of the following persons: H. Walter Webb, Guy R. McLane, Frederick Wm. Hill, S. M. Butler, A. B. Maynard, C. Arthur Benjamin, Edwin L. Thomas, Gorton Wm. Allen, F. A. Hodgman, Oliver A. Quayle, Dr. Edward G. Cox, H. A. Meldrum, Bert Van Tuyle, Frank G. Webb.

The benefits and privileges of the association as stated in its prospectus are as follows:

First—Its subscribers are furnished the services of its attor-

neys to defend them in any suit brought against them for injury to animals or damage to property (except to automobiles), where personal injuries are not an element in the case.

Second—Its subscribers are furnished the services of its attorneys in defending them, their chauffeurs, or any person operating their automobiles for any alleged violation of the automobile laws in any of the States.

Third—Its attorneys will appear for its subscribers in court.

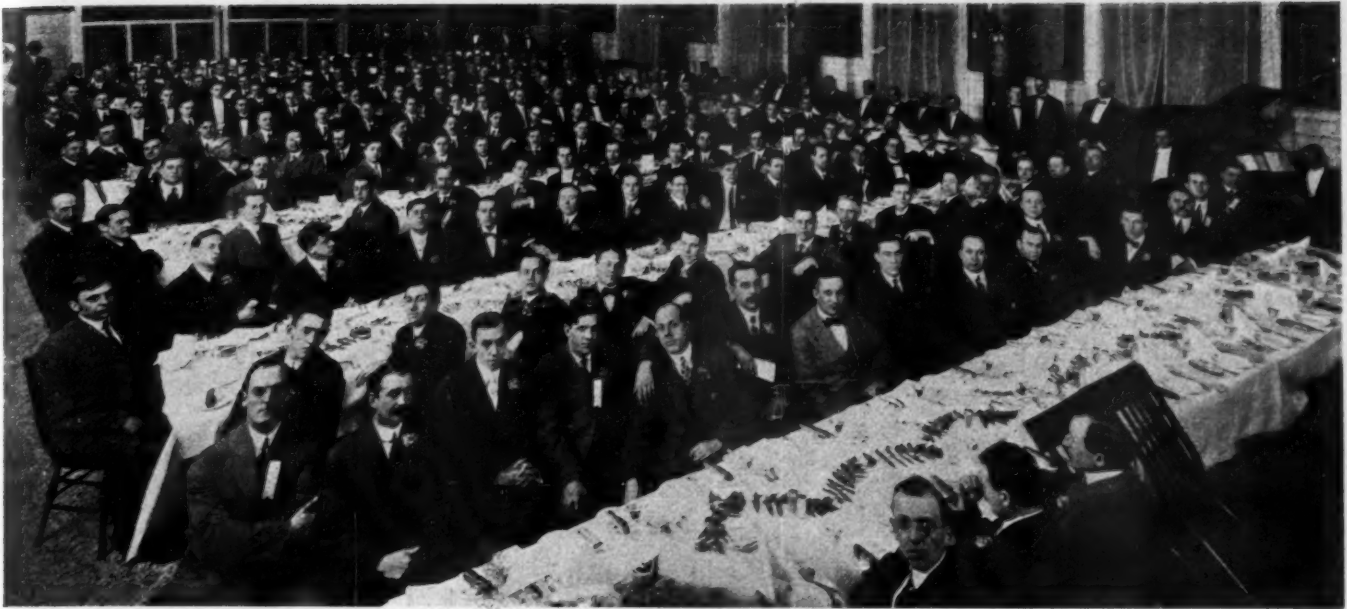
Fourth—Its attorneys will furnish its subscribers legal advice as to their rights and liabilities as automobilists.

Fifth—Its attorneys will protect the rights of its subscribers and their chauffeurs before the licensing authorities of the various States previously mentioned.

Sixth—Subscribers are furnished without charge with a copy of the A. L. A. Hand Book for each year.

Seventh—All subscribers are furnished a plate bearing the initial letters of the association.

Many automobilists carry liability insurance protecting them against liability for personal injuries, therefore this association does not enter this field, its main object being to relieve automobilists from the expense and trouble resulting from the trivial difficulties usually experienced on the road, but which cause great annoyance. Members of the association are relieved from paying all legal fees and expenses for the membership fee of \$10 annually. The offices of the organization are at 50 Church street, in the Hudson Terminal Building, New York City.



Banquet of the Chicago Motor Club, Which Was Attended by Many Prominent Automobilists

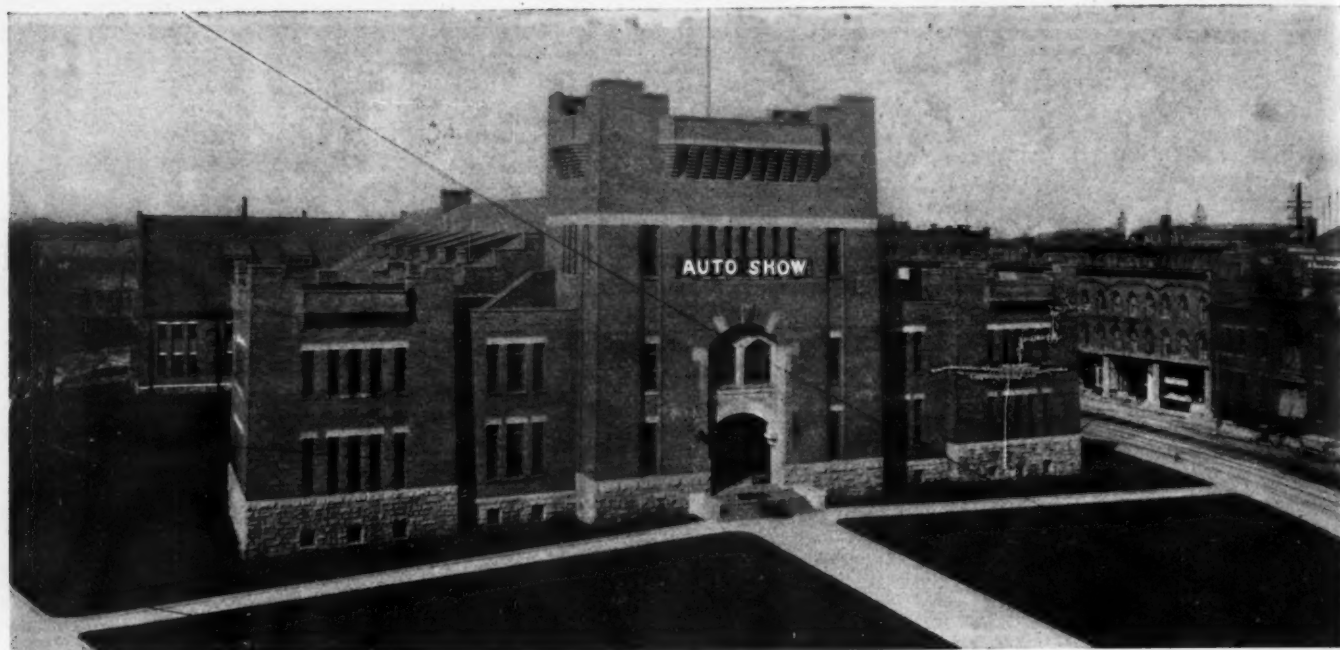
HAWKEYES HOLD GOOD SHOW IN IOWA'S CAPITAL CITY

DES MOINES, IA., Mar. 14—The show which closed here last Saturday was not only successful from an artistic standpoint, but also, what is more to the point, from the view of the business men, in the matter of sales. Opening in the Coliseum on March 5, under the auspices of the Des Moines Automobile Dealers' Association, the success of this, the first annual show, has been a source of gratification to all concerned, particularly

to the hustling committee whose work was so well rewarded. The decorations were not extensive nor expensive, consisting simply of sign boards raised upon pillars, upon which signs the exhibitors names were painted. The posts were partly hidden by garlands of smilax and other greens, while a few strings of flowers were used to separate the exhibits. The show as a whole reflected great credit on its organizers.



Scene in Coliseum at Des Moines Showing Exhibits of Buick, Winton, Detroit Electric, Maxwell and Regal



Exterior of the State Armory at Syracuse, Which is Occupied by the Automobile Show This Week

SYRACUSE SHOW REFLECTS EXPERIENCE AND ART

SYRACUSE, Mar. 16—Many of the local automobile enthusiasts, and not a few of the dealers expressed regret at the delay in opening the Syracuse Automobile Show, which is being held in the New York State Armory, the front of which is here pictured, which delay was due to the custom of utilizing the armory for State purposes on Monday nights, which are ordinarily known as drill nights. It is not believed that the Syracuse Automobile Dealers' Association, which is responsible for the high character of the automobile show, will have to lament at the delay, and in some measure, perhaps, the particularly good arrangement, readiness of the exhibitors, and splendid effect, may be traced to the very fact that ample time was available in which to prepare for the proper display of the 47 different makes, and 85 separate models of automobiles which were there arrayed, at the instance of 46 separate exhibitors.

The main floor and the basement are utilized, the former

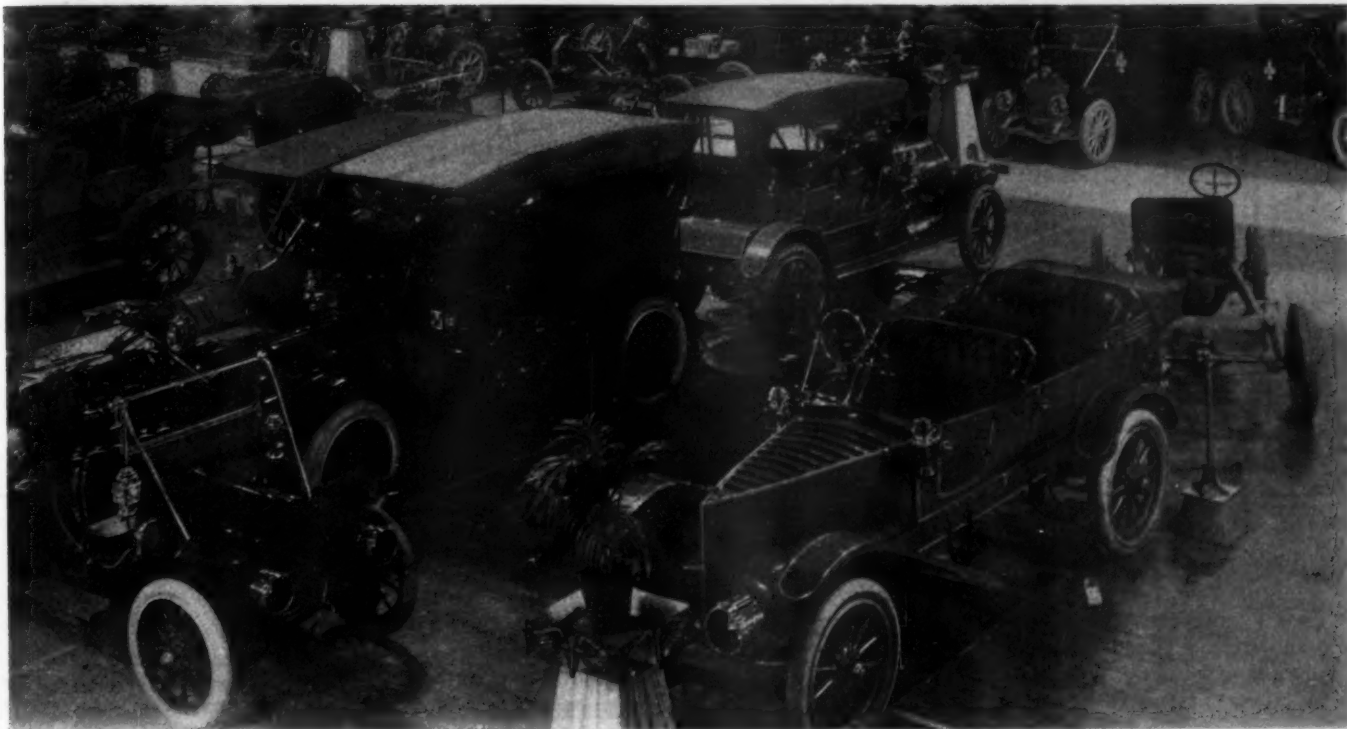
for the larger portion of the completed cars and the latter for the accessories and trucks. The decorations are not so elaborate as some others have been, but they are very pleasing and the building presents a splendid appearance. Here, again, lack of floor spaces has forced many of the dealers to cramp their exhibits and thus make the showing of their cars a difficult proposition.

The beams and rafters of the drill hall are hung in national colors and emblems. Then underneath is a veritable sky of drooping flowers of paper with lights both above and below. From the balconies are hung circles of bunting at the edges of which are myriads of lights. Palms and green flowers and plants round out the decorations nicely. At the center of the very entrance is a huge imitation pearl shell backed up with a wall of green that makes the entrance very attractive.

The revolving Thomas chassis that attracted so much attention at the Madison Square Garden show is also to be seen here and



View of Main Floor, Showing Baker Electric, Oakland, Oldsmobile, National, Ford and Others



Franklin Has a Notable and Very Complete Exhibit in Its Home Town Automobile Show. Torpedo at Right

is one of the drawing cards. In this same breath should also be mentioned the gray Franklin torpedo. This, too, was seen in the Garden and here as there it is almost unapproachable because of the enormous crowds surrounding it.

The Chalmers "Bluebird," winner of the Massapequa, also comes in for its share of attention. Elsie Janis' American Simplex or as it is now known Amplex with her photo gayly poised in one seat comes in for its share of attention among the novel-

This in addition to opening night is Automobile Club night and the local club members are out in force. A vigorous campaign is being waged this week for members.

Wednesday is Chamber of Commerce day and the business men who compose that august body are expected to attend in a crowd. They seem to realize the value of the exhibit to the community and are dignifying it by their presence.

Thursday is society day with double admission. Friday is

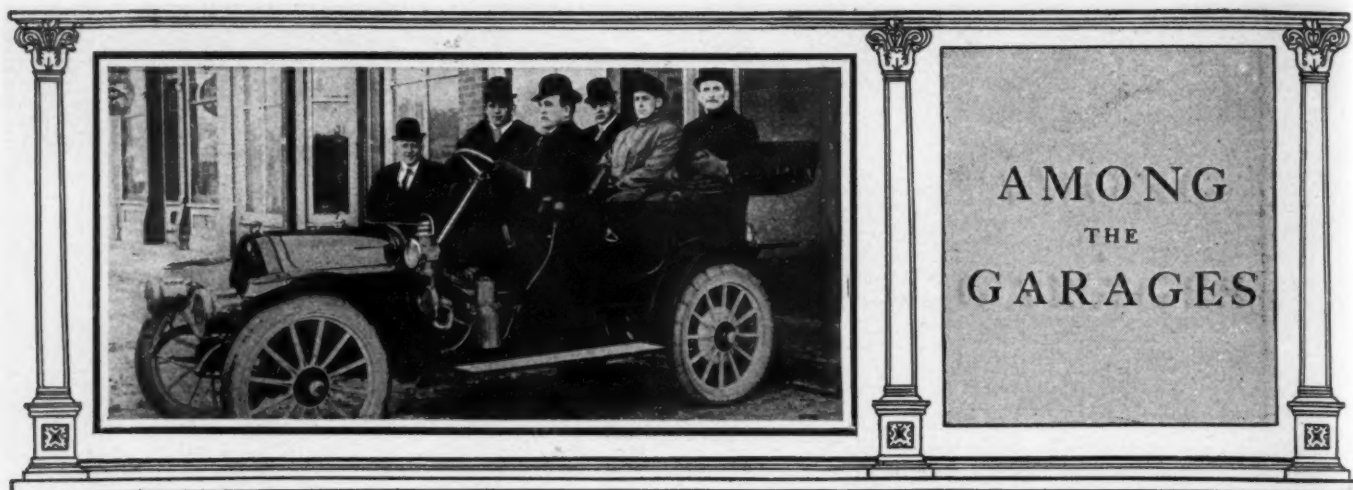
turned over for the benefit of the Mystic Krewe. This is a festival organization here corresponding to the Mardi Gras and other festivals of other cities. Saturday will see the University students turned out in force, and a gala time is expected.

The general management of the show has been in the hands of Harry D. Van Brunt and well has he looked after his end of the work. Not one jarring note could be found and the work of a master hand is in evidence on every side.

Billy B. Van, in vaudeville with the Beaumont Sisters, who is playing here this week, pulled off an original stunt on C. Arthur Benjamin, president of the local association. Mr. Benjamin has a Packard Thirty in the lobby of the Yates Hotel on exhibition. While he was at the show this afternoon Van tied on the hood a sign bearing this information: "Presented to Billy B. Van by the Hotel Clerks of Syracuse." 'Tis rumored that one Benjamin has said that he will buy freely.



A Corner of Syracuse Show Where Palmer-Singer, Oldsmobile, Packard, Regal and Baker Electric Held Forth



Reo touring car full of champions. Jeffries at the wheel; front seat, Jack McCormick and Frank Gotch; rear, Berger, Roller and Farmer Burns, all well known in sporting circles

James M. Beaver and Edgar Barber, of Lincoln, Ill., are having erected a garage building, 40 by 90 feet, of brick and concrete, on Logan street. The building will be well equipped with all modern conveniences. The agencies of the Chalmers, Hudson and Haynes cars have been secured.

Findlay, O., is soon to have a garage. Messrs. Johnson and Fortune have formed a partnership for this purpose and are remodeling the Edwards property on North Main street. They will take the agency for some car not yet decided upon and also will do a general garage business.

To accommodate the line of Regal cars, for which he holds the Trenton (N. J.) agency, John H. Ashton has begun the construction of a garage at 227 North Broad street, in that city. The building is to be three stories in height, and will make a handsome home for the Regal.

The Tynan & Reynolds garage, at 173 Van Houten street, Paterson, N. J., which was destroyed by fire recently, is to be rebuilt as soon as possible. M. A. Beekman, the owner of the property, is having plans made for a two-story structure 50 by 100 feet, to cost \$3,800.

A garage is being built at 142 North Broad street, Philadelphia, by M. R. Dillin. It is a six-story structure 51 by 83 feet, and the cost will be approximately \$80,000. The location is an excellent one, and there is every reason to believe that the venture will be successful.

The Woodsdale Motor Car Company, of Woodsdale, W. Va., a suburb of Wheeling, is now established in its new garage, which includes a well equipped repair shop. The Woodsdale Company has the local agency for the Chalmers and the Hudson.

The Central Garage Company, of Streator, Ill., has opened a garage at 125 South Park street. The building is a modern one of concrete block construction, 53 by 140 feet. The company has the local agency for the Moline.

Plans have been drawn for a garage to be located on the east side of Cleveland street, Orange, N. J., to be 40 by 100 feet. Robert Wright, of that city, is the promoter of the idea.

E. C. Sweet & Son, of Reedsburg, Wis., have opened a garage and repair shop and will distribute the Regal, with the Curtiss motorcycle as a side line.

Brief Personal Mention

Paul L. Snutsel, the well-known Belgian automobile engineer, sailed on the White Star liner *Adriatic* March 12 for an extended trip of six months or more through Europe in the interest of the Splittorf magneto. Mr. Snutsel will go direct to Turin, Italy, and will have charge of the Splittorf exhibit at

the automobile show to be held there early in April, after which he will visit the different manufacturers of France, Belgium, Germany and England.

Will B. Wreford, well-known sporting writer, and for some years automobile editor of the *Detroit Free Press*, has severed his connections with that paper, and on March 15 will become sales manager of the Michigan selling branch of the Columbia Motor Car Company, handling the gasoline cars made by that concern.

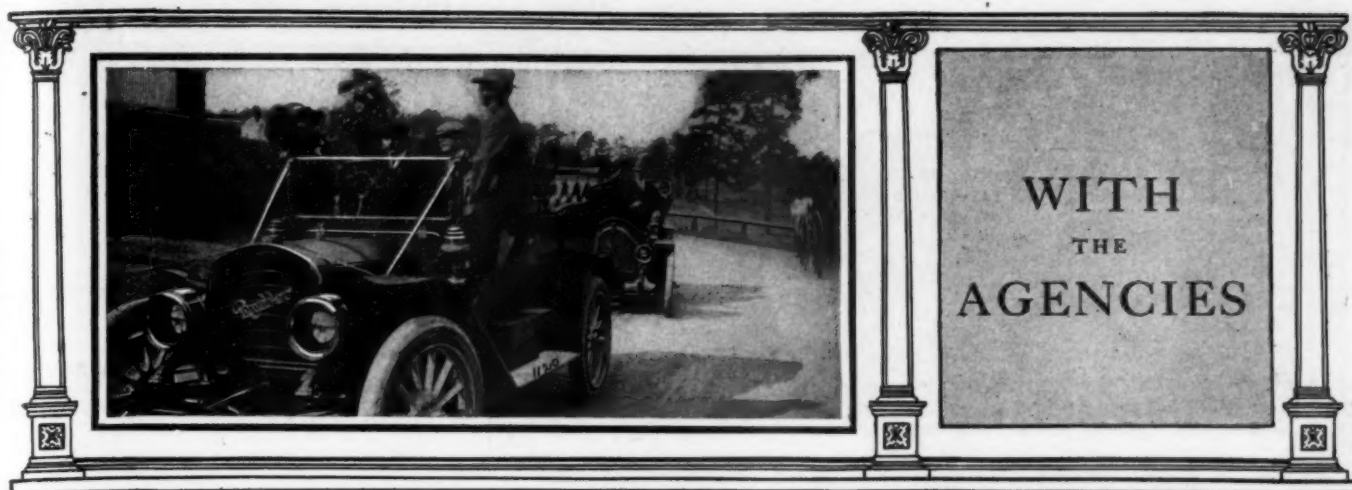
W. C. Orrell, formerly manager of the Detroit branch of the Buick Motor Company, has been made purchasing agent of the complete Buick accessory department for the United States. His former place will be filled by C. C. Starkweather, up to the present time local sales manager.

President Miller of the Mar-Del Mobile Company, Packard agent in Baltimore, Md., gave a dinner to twenty-two employees and several visiting automobilists at the New Howard Hotel. The out-of-town guests were Messrs. Chalfant, Gilbert and Baines, of Detroit, Mich.

William F. Sanger, Milwaukee, Wis., representative for the E-M-F and Flanders and associated with the new Milwaukee branch of the Studebaker Automobile Company, is a Republican candidate for Alderman in the Eighteenth Ward, Milwaukee.



Walter E. Flanders, president of the Everitt-Metzger-Flanders Company, Detroit, Mich.



As is well known, our President is very fond of golf. The picture shows him at the Country Club, Augusta, Ga., in a Rambler 45 about to set out for home after an afternoon's play

One of the best appointed of the Hartford, Conn., salesrooms is that of the Packard Motor Car Company, of New York and Hartford. Previous to opening the local branch the Packard was represented by Brown, Thomson & Company. There is a large salesroom on the ground floor and large double doors render moving cars to the street an easy matter. There is also a large elevator to carry cars to the repair department on the top floor of the building. Charles Embelton, of New York, is manager of the local branch and the repair end is left to the management of John Mead.

F. E. Avery, the Columbus, O., agent for the Packard, gave a dinner party Saturday evening, February 26, at the Ohio Club in honor of a number of the officials of the Packard company who are making an inspection trip of Packard agencies. In the party were E. P. Chalfont, sales manager; J. J. Ramsey, auditor, and J. F. Baines, manager of the service department. In addition to the above-named gentlemen the attachés of the Avery company were present.

The E-M-F and Flanders lines have been placed with the Sanger Automobile Company, 437 Milwaukee street, Milwaukee, Wis. The salesrooms are the same as used by the Milwaukee branch of the Studebaker Automobile Company, of which William F. Sanger, owner of the Sanger concern, is sales manager.



J. D. Maxwell, the creator of Maxwell cars and factory head of the Maxwell-Briscoe Company

Callahan, Atkinson & Company, Locomobile representatives, have opened up new spacious salesrooms and offices in the heart of Baltimore's retail district, at 328 North Charles street. The firm has two carloads of Locomobiles of various designs on display and these attract the attention of many passers-by.

Frank Brosn, Jr., son of Baltimore's former millionaire Governor, has joined the sales force of the Shaab Auto Company. This firm has recently taken on agencies for the Rainer, Marmon, Courier and Billy Four cars, which they handle in connection with the Renault and Stoddard-Dayton cars.

The Washington Automobile Company has opened up for business at 67 East Maiden street, Washington, Pa. D. A. Swart is proprietor of the establishment, which will handle the Lozier, Locomobile, Oldsmobile, Chalmers, Pullman, Cadillac, Overland and Hudson cars.

The Roe-Halverson Auto Company has been organized at Stoughton, Wis., to handle the Overland in Dane county, which contains Madison, the State capital. The partners are Carl and Gustav Roe and S. M. Halverson. They will also distribute the Marion in this territory.

The Taylor Motor Distributing Company has been formed by William T. Taylor, of Philadelphia, and Frank B. Cook and Philip N. Price, of Johnstown, Pa. It will establish an agency in the Real Estate Trust Building, in the latter city, for the Warren-Detroit cars.

William Beitz, of Lomira, Wis., has received the agency for the Black-Crow for Dodge and part of Fond du Lac counties. Dr. J. E. McCarty, of Eden, Wis., will handle the Black-Crow in eighteen counties in Central Wisconsin.

M. S. Keyes, formerly with the Maxwell-Briscoe Company, at the Tarrytown plant, has taken on the Regal agency for the territory in southeastern New York, exclusive of New York City, also Connecticut, Rhode Island, and northern New Jersey.

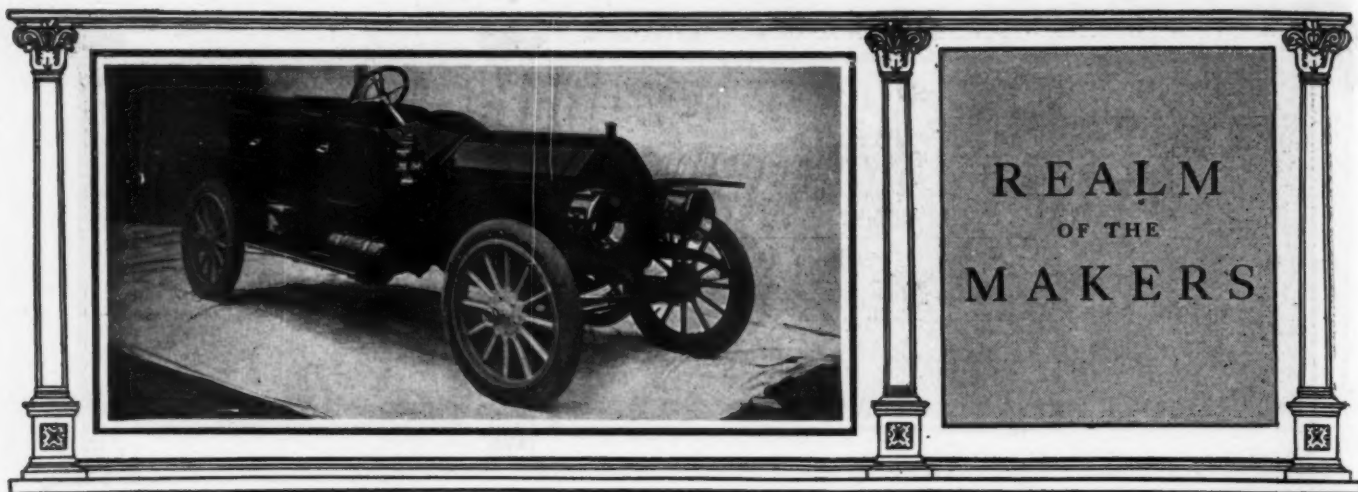
The Empire Tire Company has opened a branch house in Kansas City, Mo., in charge of Claude Beardsley, formerly a traveling salesman for that company.

The agency for the Clark cars for Kansas and western Missouri has been placed with H. B. Weils, operating as the Clark Motor Car Company, of Kansas City.

The Franklin Cycle & Supply Company, East Gay street, Columbus, Ohio, has taken the central Ohio agency for the Detroit-Dearborn line.

Leslie C. Dorland has secured the exclusive agency for the Demot in Dutchess County, New York, with headquarters at Poughkeepsie.

The Corbin agency for Wisconsin has been placed with the Curtis Automobile Company, of Milwaukee, Wis., State agents for the Reo.



One of the new model Inter-State cars, in front of the factory at Muncie, Ind. This is the very latest idea in torpedo bodies

"First in the Western Hemisphere," the Aeronautic Supply Company, 3923 Olive street, St. Louis, has issued a catalogue of aeronautic materials and supplies similar to those of the big automobile supply houses. The company's line is very comprehensive, including Gnome, Curtiss, Holmes, Easton and Elbridge motors, Honeywell balloons and dirigible envelopes, Chauvière propellers, Hartford aeroplane tires, Livingston radiators, Warner anemometers, and various kinds of fabric, steel tubing, wheels, wire, turnbuckles, etc. In addition a number of books dealing with aeronautics are listed. Considering the newness of the business, this catalogue reflects great credit on the firm issuing it.

Parry 32-36 horsepower touring cars made good showing on two of the steepest hills of Baltimore recently. In the first test one of these cars made the ascent of the incline, which has a rise of 25 feet in 230 feet, at a speed of 15 miles an hour. J. M. Wright, president of the General Auto Company, local Parry agent, and F. C. Kitchin and G. J. Kessler, of the firm, and Harry Mayer, of the Auto Supply Company, were the passengers. In another test on a similar grade the car, which was driven by Mr. Wright, made the climb at a 20 miles an hour rate. The hills are paved with rough cobblestones.

It is said that the American Motor Car Company of Indianapolis, Ind., has announced that it will leave that city, and from current reports it is said that the Parry Automobile Com-

pany has also under consideration proposals to locate in some other city. Some surprise has also been expressed that the American Motor Car Company should move to Lafayette. This latter concern expects to make the change about June 1st, when it will begin on its 1911 line. Citizens of Lafayette have raised \$150,000 for the company, \$125,000 of which will be used as a bonus for purchasing ground and erecting and equipping factory buildings. The remaining \$25,000 is to defray moving expenses.

The Hewitt Motor Car Company passed from existence Monday, becoming a part of the Metzger Motor Car Company, of Detroit, whose capital has been increased to \$1,000,000. Although its corporate existence has been terminated, the Hewitt plant in New York will be operated until a Detroit factory can be erected, which will probably be about midsummer. Twenty acres of ground will be used as a site for the motor truck plant, which will be conducted entirely independent from that at which Everitt pleasure cars are now made, and some \$250,000 will be invested in buildings and equipment.

One of the interesting features of the Milwaukee automobile show was a train run by the Kissel Motor Car Company from Hartford to Milwaukee during the show week. All the employees of the Kissel Motor Car Company were invited to the show at the expense of the company and, in order to make the trip conveniently, without interfering with working hours, a special train was chartered by the Kissel company itself, which hauled a large trainload of employees from Hartford to Milwaukee and back again, giving them opportunity to spend Sunday at the show.

Flint, Mich., is to receive a further boom as the result of two more important plants having been taken over by the General Motors Company and moved to that city. These are the Randolph Motor Car Company, of Chicago, and the MacClean Wheel Company, of Cleveland. The former company manufactures a motor truck, and will employ some 400 men. The latter makes a spring wheel of new type, which will be used on all motor trucks produced by the associated General Motors plants throughout the country, it is stated.

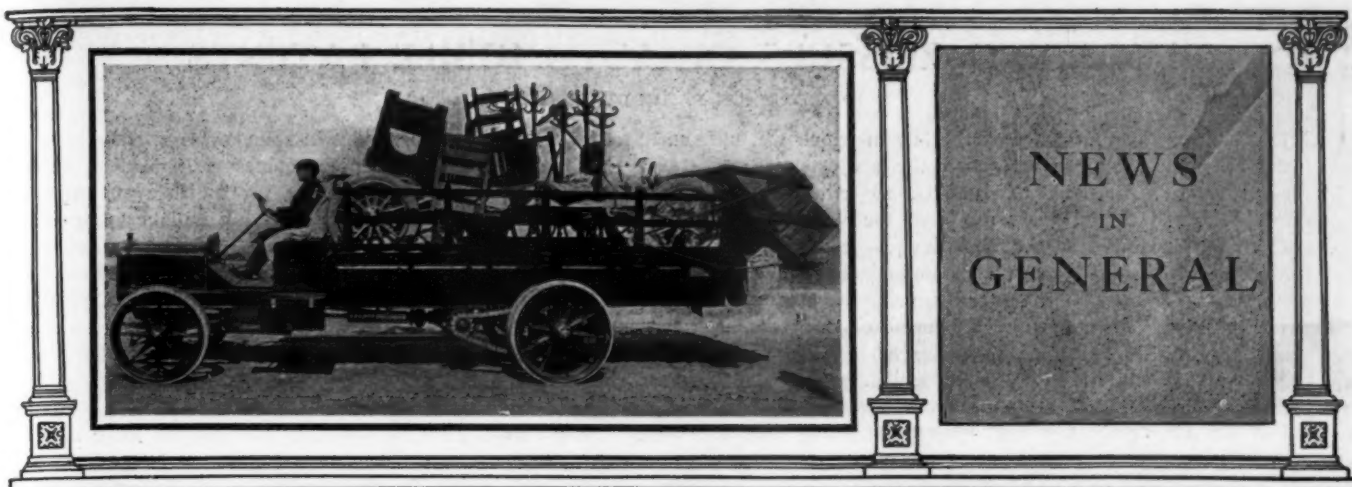
The keels (chassis) for the Moline "Dreadnought" squadron which has been entered for the 1910 Glidden run have been laid and work started in preparing this unique trio for the year's most popular endurance run. They will be put through some strenuous work among the hills in and around Moline before taking on the official war paint, which will be battleship gray, as of last year. The record achieved by the Moline in the 1909 run is evidence that it will be a prominent contestant in 1910.

The Clark Motor Car Company, Shelbyville, Ind., is now well under way, with cars coming through in quantities, and is making daily shipments.

Great Smith is now numbered among the ranks of the makers licensed under the Selden patent.



Coker F. Clarkson, assistant general manager of the A. L. A. M.



At the Boston show the White Company showed the practicability of the three-ton truck by using it to carry all material to the show

Eight prizes will be offered to automobilists who tour to Fort Worth, Tex., to attend the automobile show which will be held there March 14-19. Perhaps the most novel offer is that of E. O. Thackston and Tom Massey, of the Overland company, namely, a speedometer for the first out-of-town car which breaks the speed limit during the week. Other prizes are *Star-Telegram* trophy to the west Texas town or city sending in the greatest number of cars; Troy wind shield, by the Moline company, of Dallas, to the car which comes the greatest distance to the show; cup by the Maxwell-Briscoe-Handley Company to the group of cars which show the greatest combined mileage; silver cup, by the Texas Motor Sales Company, to the West Texas autoist bringing in the greatest number of ladies in his car; horn, by F. F. Simons, of the Stevens-Duryea Company, to the autoist bringing the greatest number of children in his car; speedometer to the first car, coming at least fifty miles, and reporting at the office of the Fort Worth *Live Stock Reporter*; eight-day clock, by the Buick company, to the car which has been in service the longest.

Increasing the size of the contest board of the Chicago Automobile Club from three to eight members would seem to indicate that President Ira M. Cobe is planning a vigorous campaign, although up to this time he has given out nothing official for publication. Joseph F. Gunther has been retained as chairman of the committee and his two 1909 associates, A. J. Banta and C. G. Sinsabaugh, also have been appointed. But President Cobe has added five others to the list, three of whom come from the trade—James E. Plew of the White, A. M. Robbins of the Oakland and Thomas J. Hay of the Ford. H. N. Scott and W. H. Thompson make up the rest of the committee.

At a special meeting of the Boston Automobile Dealers' Association, held last week, the matter of motor legislation was discussed. President L. R. Speare of the American Automobile Association was present and went over some of the bills presented. The various measures selected were discussed by the members who endorsed them, but owing to the rush incident to getting ready for the motor show they were not able to appear before the legislative committee. James T. Sullivan was appointed as representative of the association to outline their view at the hearing of the bills.

Local dealers in Baltimore have come out flatly with the statement that they and not the Automobile Club of Maryland will run shows here in the future. Club members, on the other hand, through Assistant Secretary Hutchison, assert that they have no intention at this time of discontinuing the idea of being the moving spirit in any shows to be held in Baltimore. The result is that if both sides stick to their declaration Baltimore is likely to offer two shows to the local public.

The Venango (Pa.) Automobile Company, composed of C. E. Trace and Charles H. Sheasley, and the Myers Carriage Com-

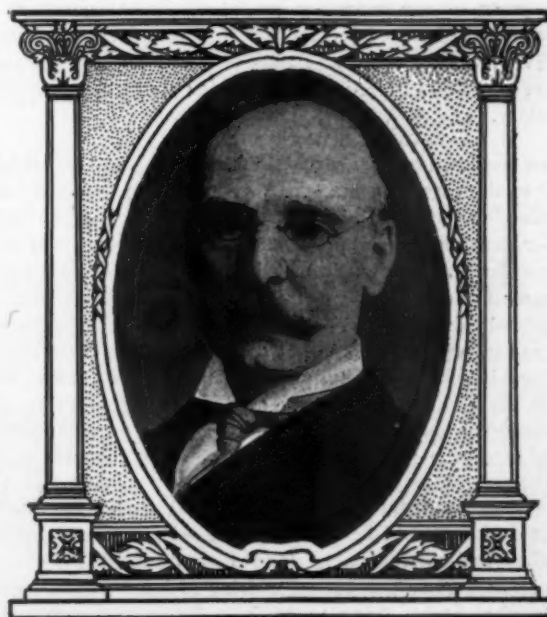
pany, have been sold to the Franklin Commercial Truck Company, which will manufacture, buy and sell automobiles. The main interest in the two old companies will control the new concern, which will be in Franklin, Pa., and will have its plants at Thirteenth and Buffalo streets in the same city. The capital is \$100,000.

The American Taxicab Company is a new Pittsburg concern located at 307 Arrott Building. The officers are: President, George J. McGinty; vice-president, James N. McGinty, and secretary and treasurer, A. A. Firestone. The company is already operating several taxicabs and will soon add a large number and establish substations in different parts of Pittsburg. This is the third taxicab company now operating in that city.

Washington, D. C., has been added to the list of cities where Alco taxicab service now exists. The Auto Livery Company has placed an initial order for a lot of cabs; the first shipment has been made. This company plans eventually to replace all of its old stock with the same type of Alco cabs now in service in New York, Philadelphia and a number of other large cities.

Six automobile shows were held during February in the Middle West and Far West, these being Los Angeles, Salt Lake City, Denver, Kansas City, Minneapolis and Omaha.

The tent erected for the Los Angeles automobile show is the largest ever raised in America. It covers 40,000 square feet.



Thomas Henderson, vice-president of the Winton Co., Cleveland

REGARDING REISSUES OF AUTOMOBILE PATENTS

By XENOPHON P. HUDDY, LL.B.

AMONG the various branches of the law in which we find the automobile and its operation the subject of legal controversies, the Law of Patents, so called, is the one branch of our jurisprudence that is at the very foundation, basis and life of the automobile industry. Independently of statutory enactment and under the common law an inventor possesses no right to restrain others from using his invention, but in order that the public may enjoy the benefit of an invention, the State grants to the inventor the exclusive right to make, use and vend the invention for a limited period, provided that the originator furnishes a full, clear and exact description of his invention so that after the patent has expired, the article may be manufactured generally for the benefit of the public.

DEFINITION AND NATURE OF PATENT

So it may be said that a patent is a grant by the government to the inventor of the exclusive right to control the manufacture and use of the article for a definite time. It has the essentials of a contract. Of course, the law governing automobile patents is not different from the law controlling other inventions. We will now direct our attention to reissues of patents.

REISSUES OF PATENTS

A patent being originally granted to secure certain rights to inventors for a limited time, a reissued patent is one which secures those rights more definitely in some particular wherein the original patent was defective. A reissued patent is in the nature of an amendment of the original. There are limitations, however, on the right to secure a reissue.

LAW GOVERNING REISSUES

The Revised Statutes of the United States, Sec. 4916, provide for the reissue of defective patents as follows:

"Whenever any patent is inoperative or invalid, by reason of a defective or insufficient specification, or by reason of the patentee claiming as his own invention or discovery more than he had a right to claim as new, if the error has arisen by inadvertence, accident or mistake, and without any fraudulent or deceptive intention, the Commissioner shall, on the surrender of such a patent and the payment of the duty required by law, cause a new patent for the same invention, and in accordance with the corrected specification, to be issued to the patentee."

SEVERAL PATENTS FOR SEPARATE PARTS

There are other provisions of the statute authorizing the Commissioner to cause several patents to be issued for distinct and separate parts of the invention patented, upon request of the applicant and payment of the fee for a reissue for each reissued letter. The specifications and claims in every such case are subject to revision and restriction in the same manner as are original specifications.

INTRODUCTION OF NEW MATTER

No new matter, however, can be introduced into the specification, nor in the case of a machine patent can the model drawing be amended, except each by the other, but when there is neither model nor drawing, amendments may be made upon proof satisfactory to the Commissioner that the new matter or amendment was a part of the original invention, and was omitted from the specification by inadvertence, accident, or mistake.

STATUTORY PROVISIONS LIBERALLY CONSTRUED

The provisions of the statute governing reissues are to be construed liberally, but the mistake or accident before referred to must have been *bona fide* and not purely an error of judgment, and it is held that the patent must have been inoperative and invalid.

WHEN REISSUES WILL BE GRANTED

Prompt action should be taken by one who desires a reissue, since laches and unreasonable delay may defeat the right. A reissue obtained after unreasonable delay and for the purpose of expanding the patent claims to embrace devices appearing since the issuance of the original patent and which are not infringe-

ments, has been held to be void. In some cases a delay of two years has been held to be unreasonable. If, however, there exists a reasonable and lawful excuse for the delay in making the application for a reissue, the application will be recognized. For instance, where a patent was obtained June 6, 1882, and was held to be void by the United States Circuit Court, June 19, 1894, and by the Circuit Court of Appeals, October 22, 1894, a reissue dated March 11, 1895, was held not to be void by reason of lapse of time, in *Maitland B. B. Goetz Mfg. Co.*, 86 Fed. Rep. 124.

WHAT MAY BE CLAIMED

Generally speaking the reissue must call for the same invention and no new matter can be included. A broader claim may, however, be made if it is for the same thing. New features may also be included. In other words, all that could have been claimed originally may be requested in the reissue. But if letters patent fully and clearly describe and claim a specific invention, complete in itself, so as not to be inoperative or invalid by reason of a defective or an insufficient specification, a reissue cannot be had for the purpose of expanding and generalizing the claim in order to embrace an invention not specified in the original. So also letters patent for a machine cannot be reissued for the purpose of claiming the process of operating that class of machines; because, if the claim for the process is anything more than for the use of the particular machine patented, it is for a different invention. See *James vs. Campbell*, 104 U. S. 356; *Burr vs. Duryee*, 1 Wall, 531; *Powder Co. vs. Powder Works*, 98 U. S. 126.

TERMS OF REISSUE

A reissued patent is valid only for the remainder of the term of the original patent.

MODIFICATIONS OF BELGIAN PATENT LAWS

Consul H. Albert Johnson, of Liege, reports that a national association has been organized to study industrial proprietorship, reforms and modifications of Belgian laws concerning patent rights and trademarks and international agreements relating thereto. He says:

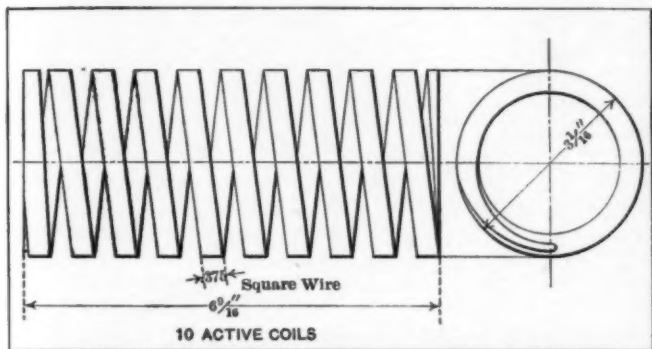
The National Belgian Society for the Protection of Industrial Proprietary Rights has been organized, with the co-operation of the Director-General of the Department of "Industrie et du Travail," the Director of the "Office des Brevets" (patent office), a number of the leading legal specialists, and prominent industrial concerns. The Belgian patent laws now in force date from 1854; those controlling trade-marks from 1879. So far as the submission of models and drawings is concerned, procedure is regulated under the decree promulgated during the time of Napoleon I, dated March 1, 1806.

It appears that under the method of procedure at present in force, in the case of an application for a patent, no provision is made either for a preliminary examination of existing patents or for printing a description of the patent issued. As these matters are considered of prime importance, the association proposes to direct its efforts toward the enactment of legislative action that will result in providing as speedily as possible for such an examination and for the printing of the description of the patent. Another important point to be urged by the new association is that of arranging the Belgian patent laws in conformity with the rulings of the international convention.

It is also claimed that there are various matters regarding the routine work incidental to procuring a patent in Belgium that can be greatly simplified in the interests of inventors, and it is asserted that, out of consideration for the many important industries in Belgium, all legislation concerning industrial proprietary rights should be given new life and be placed on a thoroughly up-to-date basis.

PROMINENT ACCESSORIES

HART & FULLER, of Hartford, Conn., have brought out a device for electrically lighting acetylene lamps which operate on the ignition circuit. The advantages of the device are that it requires no separate source of current and no individual spark coil; these economies are reflected in the consequently low price. In fact, the only parts of the device are a switch, the gas-tank valve, the "spark plugs," the points of which project across the jets of the acetylene burners, and the wiring. The switch is conveniently located under the overhang



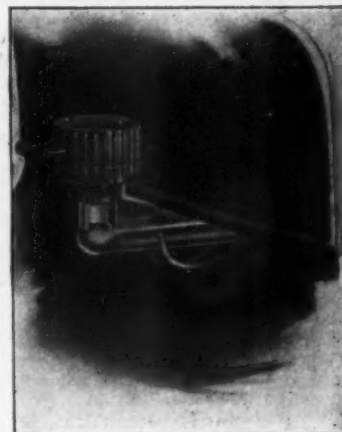
Square Wire Clutch Spring Used on Alden-Sampson Trucks

of the front seat, so that it is practically invisible and at the same time is easily reached by the operator.

This switch is so connected into one of the high-tension circuits that the latter can be short-circuited across the lamp spark plugs. These have their points rather closer together than the cylinder spark-plugs, and do not work under compression, so that this circuit offers considerably less resistance than the regular one, and the current flows through it by preference whenever the switch allows.

The valve of the gas-tank is disposed by the side of the switch, convenient to the operator's hand; the gas is first turned on, and after a suitable interval, to allow it to reach the burners, the switch is turned on and the spark jumping across the jets ignites the gas. This system offers the excellent advantage of permitting the autoist to control the intensity of illumination from the lamps by the mere process of adjusting the flow of the gas by the means which is ready at hand.

Among the interesting features of the Alden Sampson trucks, made by the Alden Sampson Mfg. Co., of Pittsfield, Mass., is the clutch spring, an illustration of which is offered herewith. The spring, contrary to the usual practice, is formed of square instead of round wire, the cross-section being 3-8 inch in each dimension. The spring is wound on a special machine, and the ends are ground off at right angles to the axis. There are ten complete coils. The overall dimensions are 6 9-16 inches long and 3 1-16 inches in diameter.

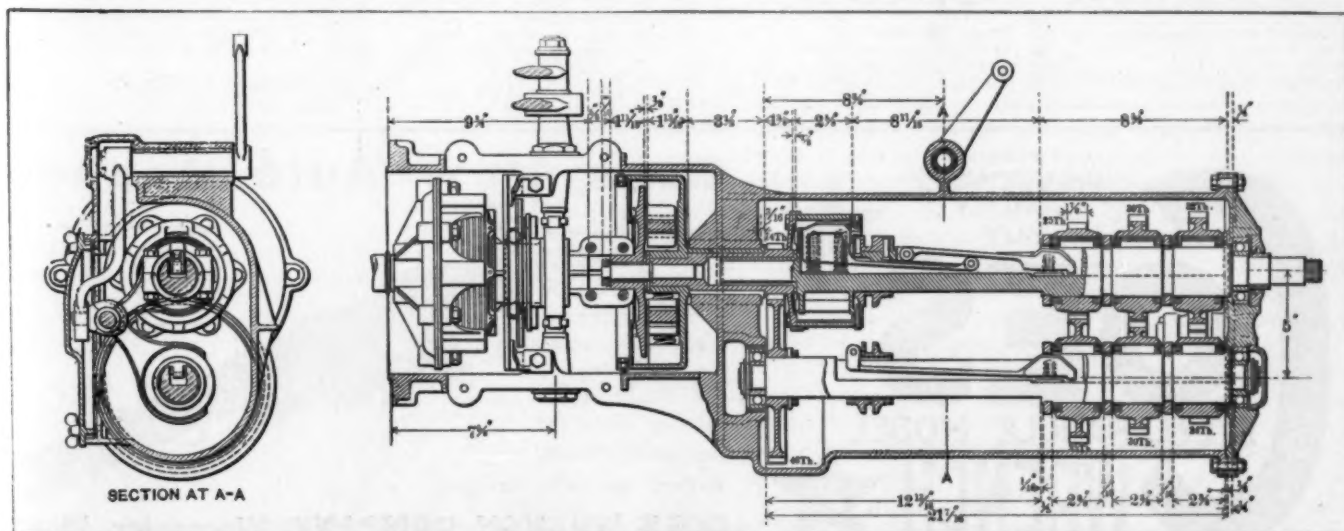


Hart Gas Lamp Lighter

PARKER AUTOMOBILE TRANSMISSION GEAR

CHICOPEE FALLS, MASS., is the scene of a new undertaking which is attracting the notice of automobile engineers of discrimination. The Parker transmission gear, a section of which is here given, is responsible for the excitement, and it promises to overcome the mechanical objections to the clash type of sliding gear now in common use in automobiles. The Parker gear, as the section shows, is of the type which allows the sets to remain in constant mesh, but by means of sliding members

which are flush in grooves of the respective shafts. The speed changing gears may be selected to suit the exigencies of service, and the remaining gears are idle. The system has been tried out under severe conditions of service, and the new design will economize space considerably, as compared with the first model, as here illustrated. In this case, the multiple disc clutch is within the gear housing, but this is a detail which may be altered at will. The same thing, of course, applies to shaft centers and other details,



Section Through and End View of New Parker Automobile Transmission Gear, Showing Operating Means

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